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Zimbabwe Digital Agriculture Assessment

A report for USAID/Zimbabwe

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List of Acronyms

AFS	Advanced farming system
AGRITEX	Agricultural Technical and Extension Services
AIMS	Agricultural Information Management System
AMA	Agricultural Marketing Authority
ANCHORS	Accelerating New Community-based Holistic Outcomes for Resource Sustainability
APIs	Application programming interfaces
APT	Agricultural Partnerships Trust
CoP	Community of Practice
CBZ	Commercial Bank Zimbabwe
CICO	Cash in and cash out
CNFA	Cultivating New Frontiers in Agriculture
CVICs	Containerised Village Information Centers
D4Ag	Digitalization for Agriculture
DECA	Digital Ecosystem Country Assessment
DFS	Digital financial services
DFL	Digital financial literacy
DPA	Data Protection Act
DSGI	Digital Skills Gap Index
DVI	Digital Villages Initiative
EGDI	E-Government Development Index
ERP	Enterprise resource planning
FAO	The Food and Agriculture Organization
FARM	Fostering Agribusiness for Resilient Markets
FfF	Foundations for Farming

GIS	Geographic information systems
GISP	Government Internet Service Provider
GMB	Grain Marketing Board
GoZ	Government of Zimbabwe
HDC	Horticulture Development Council
ICT	Information and communication technology
IMTT	Intermediated Money Transfer Tax
IPs	Implementing partners
ISPs	Internet service providers
ITU	International Telecommunications Union
IVR	Interactive voice response
KIIs	Key informant interviews
KTA	Knowledge Transfer Africa
MFIs	Microfinance institutions
MNO	Mobile network operator
MoLAFWRD	Ministry of Lands, Agriculture, Fisheries, Water, Climate and Rural Development
MoPSE	Ministry of Primary and Secondary Education
MPCI	Multiple peril crop insurance
NDS	National Development Strategy
NFIS	National Financial Inclusion Strategy
ODK	Open Data Kit
OPC	Office of the President and Cabinet
P2P	Person-to-person
PAYG	Pay-as-you-go
POTRAZ	Postal and Telecommunications Regulatory Agency of Zimbabwe

RBZ	Reserve Bank of Zimbabwe
SACCOs	Savings and credit cooperative organizations
SFA	Sales Force Automation
SHFs	Smallholder farmers
SIA	Strategic Impact Advisors
SLI	Social Learning Innovation
SMART	Spatial Monitoring and Reporting Tool
SMS	Short message service
SI	Statutory Instrument
TranZDVC	Transforming Zimbabwe's Dairy Value Chain for the Future
UNDP	United Nations Development Programme
USADF	United States African Development Foundation
USAID	United States Agency for International Development
USD	United States dollar
USSD	Unstructured Supplementary Service Data
WCA	Wildlife Conservation Action
WFP	World Food Programme
WHH	Welthungerhilfe
ZADF	Zimbabwe Association of Dairy Farmers
ZAGP	Zimbabwe Agricultural Growth Programme
ZDIT	Zimbabwe Dairy Industry Trust
ZFU	Zimbabwe Farmers Union
ZMX	Zimbabwe Mercantile Exchange
ZRBF	Zimbabwe Resilience Building Fund
ZWL	Zimbabwean dollar

Executive Summary

This report provides an overview of the digital agriculture ecosystem in Zimbabwe to inform current and future USAID/Zimbabwe programming that supports the advancement and adoption of digital agriculture tools in the country. In pursuit of this objective, Strategic Impact Advisors (SIA) conducted comprehensive desk research and held key informant interviews (KIIs) with a range of stakeholders to establish an understanding of the digital agriculture products and services available in Zimbabwe, as well as their current and potential usage.

Zimbabwe has a growing and innovative digital agriculture landscape, with many products, and services being developed and provided by private technology companies. Several international development organizations and agribusinesses have also built and deployed their own products, such as advisory applications. Many of the services provided by agribusinesses, such as GPS-fitted tractors or irrigation technologies, are targeted at large-scale commercial farmers who have a higher ability and willingness to pay for these services than smallholder farmers (SHFs).

Advisory services are the most popular category of digital agriculture offerings present in Zimbabwe. WhatsApp is the most widely-used application by development organizations, cooperatives, and agribusinesses to deliver agronomic advice to farmers. There are also numerous crop-specific mobile applications, as well as unstructured supplementary service data (USSD) and short message service (SMS) subscription services provided by mobile network operators (MNOs) that deliver farming advice. The supply of market linkage and e-commerce services has also expanded in response to COVID-19 restrictions. While much of the market linkage and e-commerce services are taking place on social media platforms, including WhatsApp and Facebook, several digital agriculture providers have developed similar platforms to facilitate the buying and selling of inputs and products.

SIA identified various key demand and supply side challenges affecting the development, delivery, and adoption of digital tools in the agriculture sector. Limited digital literacy, lack of access to finance, and high data costs all impact the adoption and usage of digital tools among SHFs. Additionally, connectivity gaps between urban and rural areas prevent rural communities from fully adopting and benefiting from digital technologies beyond advisory services delivered through channels such as SMS and USSD. Digital agriculture service providers also cited high costs needed to drive initial and sustained adoption as a challenge impacting the development of tools and services.

Despite these identified challenges, several building blocks are in place that can help spur further development, adoption, and usage of digital agriculture services in Zimbabwe: a young and extremely literate population, high mobile money account penetration rates, and a diverse set of stakeholders that are well-positioned and willing to accelerate the digital agriculture ecosystem further. Below, this report highlights key recommendations based on this landscape

assessment and frames them around three primary categories: 1) supply side, 2) demand side, and 3) ecosystem support.

Supply Side Recommendations

Recommendation 1: Leverage Public-Private Partnerships to Promote Offline Digital Solutions.

Two key barriers to the adoption and usage of digital tools and services among rural farmers include connectivity challenges in rural areas and high internet costs. Programs implemented by USAID implementing partners (IPs) can consider leveraging offline digital solutions to disseminate content and information to farmers in remote areas of the country.

The Raspberry Pi device is an example of an offline solution that Foundations for Farming (FfF) is currently piloting. It is a weatherproof, solar-powered device developed by Arizona State University that allows farmers to connect to the Wi-Fi signal and watch FfF's training videos from their own smartphone or Wi-Fi-enabled device for free. The device connects to 30 users at a time.

Recommendation 2: Encourage the Development of Digital Products and Services with Potential for Commercial Viability.

The usage of many digital solutions ends after pilot phases without a commercially viable plan to scale up uptake and usage. To push innovations beyond the pilot phase, USAID/Zimbabwe, as part of current and future programming, could leverage public-private partnerships to promote digital innovations and provide technical assistance to build digital solutions beyond pilots toward commercial viability. Any digital agriculture solution that development partners wish to promote should be sourced through a private sector company that identifies the agricultural sector as a core of its business, intends to deliver the service to actors in the agricultural sector, or has the willingness to expand to the agricultural sector, with an accompanying roadmap for the expansion. Solutions should also be market-driven and priced according to end users' willingness and ability to pay.

Recommendation 3: Institute Incentive-Based Risk Sharing for Agricultural Lending.

The volatility of the agriculture sector makes financing unattractive for financial service providers such as Stanbic Bank and other commercial banks and financial institutions. To de-risk agricultural financing and stimulate increased lending by digital finance providers, the Government of Zimbabwe (GoZ) should institute a body to lead the provision of credit risk guarantees to providers. This body will increase lending to agricultural value chain actors, especially SHFs and commercial farmers, and enable them to utilize digital financial tools and technologies available for the agricultural sector.

We suggest that the Ministry of Lands, Agriculture, Fisheries, Water, Climate and Rural Development (MoLAFWRD) should spearhead advocacy with the Reserve Bank of Zimbabwe (RBZ) to institute the formation of the Zimbabwe Incentive-Based Risk Sharing for Agricultural Lending Agency to de-risk agricultural financing. This agency will strengthen the capacity of financial service providers to assess, structure, and manage agricultural lending. In support of these efforts, USAID/Zimbabwe could encourage the formation of a Community of Practice (CoP) that will liaise with other agricultural donor organizations for buy-in to develop a policy roadmap for submission to MoLAFWRD for consideration, as well as facilitate onward discussions with other industry players like RBZ and financial institutions on the approach to develop and implement the lending body.

Recommendation 4: Encourage Technology Providers to Target the Agricultural Sector and SHFs through Tax Incentives.

Agriculture remains the engine of growth for the Zimbabwean economy, with almost 14 percent contribution to GDP, 70 percent employed by the sector, and 60 percent contribution of raw materials.[1] To promote innovation and growth of digital agriculture solutions, GoZ can consider enacting tax incentives for companies and organizations developing services that drive rural adoption, especially among farmers and other agricultural value chain actors. These tax incentives will motivate technology service providers to deploy digital technologies to unserved and underserved rural communities. The GoZ previously introduced a similar tax incentive scheme for companies that employed youth under 30 to generate more jobs[2], setting a precedent that can apply to the digital agriculture sector.

Through the same CoP, USAID/Zimbabwe should consider working with their agriculture IPs, other donor organizations, and digital solution providers to develop and submit a tax incentive policy roadmap to the Postal and Telecommunications Regulatory Agency of Zimbabwe (POTRAZ) for consideration. Additionally, to prompt digital entrepreneurship, USAID/Zimbabwe could review existing grants to channel resources to start-ups at the proof-of-concept and scale-up stages for youth-led technology solutions committed to rural farmers. To allocate funding to these grants, USAID/Zimbabwe could evaluate the start-up's sustainability plan, revenue model, customer onboarding plan, partnerships, business case, and cost-share willingness to identify any potential risks before committing funds.

Recommendation 5: Promote Coordination Among Agricultural Donors and Create Opportunities for Providers to Showcase Their Products.

We suggest that every quarter, the CoP mentioned in recommendation three should hold discussions on prevailing digital products and services that their respective IPs are adopting. These discussions will create cordial synergies and reduce duplication of funding efforts on

[1] MFA. "Zimbabwe in Brief."
[2] Zimbabwe Revenue Authority. "Youth Employment Tax Incentive." 2020.

similar digital innovations. Creating greater coordination among donors will foster the scale-up of digital agriculture solutions programming and sustainability of service delivery to farmers.

USAID/Zimbabwe can serve as a convener to work with other organizations to raise funds to run these stakeholder dialogues. USAID/Zimbabwe could liaise with other stakeholders to align on dates and manage virtual or in-person meetings where digital agricultural innovators can present their products and services for buy-ins and partnerships, such as through the Market Linkage Association. Not only will this allow service providers to share successes and developments in the digital agriculture space, but it will enable donors to stay current on digital innovations in the sector, which can help inform funding priorities.

Recommendation 6: Vet Sustainability Plans from Technology Service Providers

USAID/Zimbabwe should encourage IPs to vet sustainability or business plans from technology providers before contracting them for their programming. By vetting sustainability or business plans, USAID/Zimbabwe can ensure that there is a roadmap for achieving long-term goals, product delivery sustainability, and strategies in the areas of finance, sales and marketing, product design and development, partnerships, technical delivery, a business case, and revenue growth of the providers.

USAID IPs should also seek to understand the context under which each technology was developed and deployed, including the digital literacy requirements of intended users, device and connectivity requirements, and the socio-economic status of intended users. Understanding these factors will help USAID IPs determine if the technology reflects their project context and how it can be effectively applied or adapted in programming. This recommendation reflects concerns cited by many IPs and development organizations that usage of digital tools and technologies will cease once a program ends due to a lack of sustainability or relevance among users.

Demand Side Recommendations

Recommendation 1: Implement Digital Literacy and Digital Financial Literacy (DFL) Campaigns.

EcoCash, NetOne, Stanbic Bank, and others have mobile financial services that could easily transcend to benefit rural populations. Implementing programs that focus on building the capacity of SHFs on digital literacy and DFL can help create awareness and build confidence in DFS offered in Zimbabwe, such as savings, payments, and credit, as well as other digital tools developed for the agriculture sector. For instance, SIA developed an open-source and women-centric digital financial literacy campaign in English, French, Swahili, and other local languages. Anyone can adapt the content to reflect specific DFS providers' offerings or local

languages in Zimbabwe for adoption by agricultural value chain actors, including women and youth.

Basic digital literacy campaigns could cover topics including basic phone numeration, navigation, and digital platforms education and include practical steps to encourage the adoption and uptake of digital devices. A typical example is the free Mobile Internet Skills Training Toolkit developed by GSMA, which teaches people the basic skills to access and use mobile internet. USAID/Zimbabwe could encourage its activities and IPs to incorporate digital literacy and DFL topics into existing trainings. Conversely, IPs and activities could provide digital literacy and DFL content they develop to digital agriculture service providers using digital technologies.

Recommendation 2: Increase Awareness of Digital Agriculture Technologies Among IPs.

USAID/Zimbabwe should consider facilitating discussions and coordination among development organizations and the private sector to share lessons and experiences with digital tool adoption and usage. These discussions could also help ensure that providers develop digital agriculture services in line with the needs of excluded populations. The Mission could also do referrals of existing digital agriculture technologies stipulated in this report where IPs will, on their own, approach digital agriculture service providers to identify digital tools that have gained traction from SHFs. These referrals will enable IPs to strategize, request sustainability or business plans, align, collaborate, and implement with the private sector for scale and sustainability. IPs should conduct their own due diligence to ensure that the technology aligns with programming needs by examining the successes, clientele base, risks, challenges, and mitigation strategies associated with the technologies and providers.

Recommendation 3: Increase Access to Affordable Financing for Youth and Women.

Piloting digital savings and micro-loan initiatives with lower interest rates could be an opportunity to improve access to finance for SHFs in Zimbabwe, particularly young SHFs and women. Many stakeholders interviewed, including Farmshop, Horticulture Development Council (HDC), and Bain New Holland, stated that access to finance is a major setback for SHFs to access some digital technologies and services introduced into the market. The development of blended finance initiatives by financial institutions and donor organizations that accumulate funding from both private and public sector players for women and youth farmers could reduce issues around access to finance. We suggest that USAID/Zimbabwe include blended finance initiatives in future programming to make financing available for farmers who do not typically have collateral, which will make them better positioned to access digital agriculture technologies that they previously could not benefit from.

Ecosystem Support Recommendations

Recommendation 1: Encourage Usage of the Spatial Monitoring and Reporting Tool (SMART) for Data Collection Among IPs Working in Wildlife and Conservation.

Several development organizations in the wildlife, conservation, and tourism industries, including WILD Africa and Wildlife Conservation Action (WCA), attested to the need to deploy SMART for data collection and analysis. Organizations cited more benefits of SMART when compared to other data collection tools, such as Open Data Kit (ODK), including increased functionalities and improved data-sharing capabilities with external stakeholders. IPs in the wildlife, conservation, and tourism sectors should consider adopting these tools as they enable flexible and comprehensive data collection and analysis on programming. This platform will allow USAID/Zimbabwe to access accurate and reliable data on activities tracked in a program's monitoring and evaluation phase.

Recommendation 2: Provide Technical Support for Innovation Hubs and Ecosystem Actors.

Innovation hubs and ecosystem actors such as Econet's Muzinda Hub initiative, the TechVillage Innovation Hub, and universities provide critical infrastructure and support that help build the capacity of entrepreneurs and innovators to turn their ideas into viable business models. Supporting these hubs and organizations is essential for developing the next generation of digital innovation talent, especially considering Zimbabwe's large youth population. These actors also play a crucial role in nurturing talent from under-represented populations, such as women entrepreneurs and those from disadvantaged communities. USAID/Zimbabwe or its IPs could provide the physical resources and shared services that enable the innovation hubs to deliver, improve, and innovate services for the agriculture sector. This support could also include the development of a digital agriculture strategy, training (such as promoting and disseminating competencies related to the agriculture sector), and participating in research and development projects to foster innovation transition.

Recommendation 3: Promote a More Collaborative Digital Ecosystem With Increased Sharing of Data and Resources.

The opening up of application programming interfaces (APIs) is a crucial step to promote new innovations over the existing digital infrastructure and platforms. Critical databases, such as those developed by the MoLAFWRD, WeEffect, Econet, and NetOne, can be opened for integration to support other innovations that enhance sector-wide efficiencies. Zimbabwe can learn from the experiences of Kenya and Uganda, where dominant mobile money providers have opened up their APIs to local third-party developers to stimulate greater innovation in products.

Introduction

Purpose of the Assessment

The objective of this assessment is to help USAID/Zimbabwe establish a strong understanding of Zimbabwe's digital agricultural landscape. The assessment examines Zimbabwe's digital agricultural market ecosystem, considering both demand and supply side factors and supporting functions and regulations. Our goal for this report is to provide USAID/Zimbabwe and its key partners with relevant and realistic recommendations to help strengthen the quality of digital agricultural products and services available in Zimbabwe, while also increasing the awareness and usage of these products and services by USAID IPs. The recommendations provided in this report are intended to inform ongoing and future programming. The key activities of the assessment included:

- Undertaking a mapping exercise of relevant stakeholders within the digital agriculture ecosystem of Zimbabwe;
- Understanding the use of digital tools for monitoring crops and livestock production;
- Identifying key challenges and opportunities to leverage digital tools and technologies for the agricultural sector aligned with the priorities of USAID/Zimbabwe;
- Developing recommendations for USAID/Zimbabwe on how to adopt emerging digital technologies in programming.

Zimbabwe Agricultural Overview

Agriculture is a significant component of Zimbabwe's economy. About ten million of Zimbabwe's 15.3 million people live in rural areas.[3] Roughly two-thirds of Zimbabwe's population works in agriculture, and more than 80 percent of households in rural areas depend on agriculture for their livelihoods. Additionally, women make up approximately 61 percent of farmers and 70 percent of the agricultural workforce.[4] According to FAO, agriculture contributes roughly 17 percent to Zimbabwe's GDP, supplies 60 percent of the raw materials required by the industrial sector, and contributes 40 percent of total export earnings. About 33 million out of the country's 39 million hectares are used for agricultural purposes.[5] Despite the country's extensive availability of agricultural land, Zimbabwe is a net importer of food, and more than 5.2 million Zimbabweans faced hunger at the beginning of the harvest season in 2022.[6]

[3] UNDARK. "Health Workers Fill the Gaps for Millions of Zimbabwean Villagers." 2022.
[4] WFP. "Zimbabwe country strategic plan (2022–2026)." 2022.
[5] FAO. "Zimbabwe at a glance."
[6] The Africa Report. "Why is Zimbabwe importing grain despite billions spent on the CAP?" 2022.

Maize is Zimbabwe's staple and most popular crop. From May 2021 to April 2022, maize production was estimated to be 2.7 million tons.[7] Other important crops include wheat, millet, sorghum, tobacco, peanuts (groundnuts), soybeans, bananas, and oranges.[8] 80 percent of agricultural production is rain-fed, and 20 percent is irrigated, making Zimbabwe one of the highest irrigation-dependent countries in Southern Africa.[9] Zimbabwe's agro-processing activities include sugar, edible oil, tea, and animal feed production, and the milling of maize and wheat.[10]

66% of Zimbabwe's population works in agriculture.

Women make up 70% of the agricultural workforce.

Livestock and its associated products also significantly contribute to Zimbabwe's economy. FAO estimates cattle accounts for between 35 percent to 38 percent of Zimbabwe's agricultural GDP. Additionally, 60 percent of rural households own cattle, between 70 percent to 90 percent own goats, and over 80 percent own chickens. Not only does livestock support rural livelihoods through the provision of meat, eggs, hides, milk, and manure, but they also are a safety net and can be a source of cash, especially in times of crisis such as an extreme weather event.[11]

Zimbabwe is prone to shocks that affect agricultural and livestock production, including extreme weather events, inflation, and external geopolitical conflicts. The country ranks 15th on the Global Climate Risk Index,[12] and is projected to face increased warming, a reduction in rainfall, and an increased frequency and intensity of tropical storms, floods, and droughts. As most of Zimbabwe's population depends on rain-fed agriculture, the trend towards low and erratic rainfall will pose challenges to the sector. Additionally, the volatile macroeconomic environment causes challenges as the local Zimbabwean dollar (ZWL) currency continues to depreciate against the United States dollar (USD), and the prices of goods and services increase. The World Bank estimates that the real annual food inflation rate was 121 percent in January 2023 (in ZWL), which is the highest in the world.[13] The Russia-Ukraine war has also affected the agricultural sector, namely the price of fertilizer, which has increased from US$37 to between US$55 to US$60, placing this product beyond the reach of most SHFs.[14]

In Zimbabwe, farmers are generally categorized based on the size and scale of their agricultural activities. According to FAO, the country has over seven million SHFs and communal farmers. SHFs mainly use traditional farming methods, have small plots of land, and supply roughly 60

[7] USDA. "Grain and Feed Annual Report." 2021.
[8] Crop Trust. "Zimbabwe."
[9] World Bank. "Climate Risk Country Profile." 2021.
[10] Research and Markets. "The Agri-Business Sector in Zimbabwe 2020." 2021.
[11] FAO. "Zimbabwe at a glance."
[12] Reliefweb. "Global Climate Risk Index 2021." 2021.
[13] Reliefweb. "Zimbabwe Food Security Outlook Update." 2023.
[14] Gabriel Manjonjo. "Fertilizer Price in Global Frenzy." 2022

percent[15] of the country's food. Communal farmers cultivate land in communal areas of the country, where the land is owned and managed by the state in consultation with the traditional leaders in the area. The GoZ estimates that there are approximately 50,000 medium- to large-scale commercial farmers,[16] who operate larger farms and use advanced farming technologies and equipment.

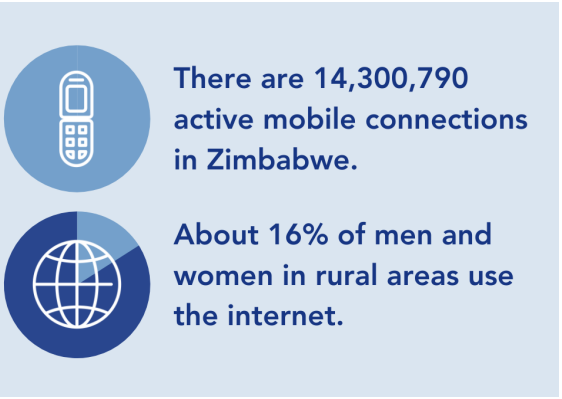
Zimbabwe has a significant number of agribusinesses engaged in various aspects of the agricultural value chain, such as input supply, production, processing, and product marketing. Most agribusinesses engaged for this assessment use digital tools and services and cited the COVID-19 pandemic restrictions as a factor for increased uptake and usage. Certain technologies provided by agribusinesses remain inaccessible for SHFs due to their high cost, such as tractors with advanced farming systems (AFS) technology and irrigation technology.

Zimbabwe Digital Trends and Digital Ecosystem Overview

Although a USAID Digital Economy Country Assessment (DECA) has not been conducted in Zimbabwe, a summary of the country's digital ecosystem framework elements can be found below.

- *Digital Infrastructure and Adoption*

The lack of affordable and reliable internet connectivity remains a key barrier to inclusive digital growth in Zimbabwe. The average cost per one gigabyte of mobile data is US$4.26. Additionally, Zimbabwe is the third-most expensive country in the world in terms of monthly average broadband cost.[17] Statistics on Zimbabwe's internet penetration rate vary. POTRAZ identified a 65.3 percent internet penetration rate in the fourth quarter report of 2022,[18] whereas other sources identify a rate of 35 percent as of January 2023.[19] As of 2020, the proportion of women and men using the internet was almost equal, though varied between geographic areas, sitting at about 29 percent for the total population, 16 percent in rural areas, and 53 percent in urban areas.[20] Recognizing the importance of improving the population's access to the internet, the GoZ has set a goal of 75 percent internet connectivity by 2025.[21]



[15] KII with Foundations for Farming. 2023.
[16] Trade.gov. "Zimbabwe - Country Commercial Guide." 2022.
[17] Cable.co.uk. "Global broadband pricing league table." 2023.
[18] POTRAZ. "Abridged Postal and Telecommunications Sector Report." 2023.
[19] Datareportal. "Digital 2023: Zimbabwe." 2023.
[20] USAID. "Data Services."
[21] Republic of Zimbabwe. "National Development Strategy 1." 2021.

Zimbabwe's score on GSMA's Mobile Connectivity Index is slightly above that of Sub-Saharan Africa. Taking into account the index's four key enablers - infrastructure, affordability, consumer readiness, and content and services - Zimbabwe scores 42.4/100, which is slightly higher than Sub-Saharan Africa's index score of 41.5. Of the four key enablers, Zimbabwe scores highest in consumer readiness at 61.8 and lowest in affordability at 26.8.[22] According to POTRAZ, there are 14,300,790 active mobile connections as of December 2022,[23] though this is not reflective of the number of unique subscribers and may include users with multiple phone lines.

Zimbabwe has a smartphone ownership rate of 52 percent, which is much lower when compared to neighboring countries, with Kenya and South Africa having 80 percent and 90 percent penetration rates, respectively.[24] Additionally, smartphone ownership among farmer categories is uneven, as KIIs with technology partners revealed that large-scale commercial farmers are more likely to have smartphones than SHFs. The distribution of mobile base stations is also uneven, with only 30 percent[25] of mobile base stations located in rural areas, reflecting the digital divide between rural and urban geographies.

- *Digital Governance*

The GoZ has played an important role in the development of the country's information and communication technology (ICT) sector. Zimbabwe's ICT sector operates under the Post and Telecommunications Act of 2000 and subsequent amendments.[26] The main mandates of the act are to ensure sufficient provision of domestic and international telecoms services, promote fair tariffs for telecoms services, ensure that telecoms services are developed in accordance with demand, and maintain competition in the market. This act also established POTRAZ to function as an independent regulator and issue licenses in the postal and telecommunications sector. The Ministry of ICT, now the Ministry of ICT, Postal, and Courier Services, was subsequently established in 2009 and given policy oversight for the sector's development.

The Office of the President and Cabinet (OPC) governs ICT use within the government.[27] The Government Internet Service Provider (GISP), established in 2008, reports to the OPC and has introduced government websites (https://www.zim.gov.zw/) and emails to improve service delivery to citizens and coordination between ministries. Additionally, the e-Government Unit in the OPC, established in 2018, promotes the adoption and usage of ICTs in government operations and service delivery to citizens. Currently, citizens can access e-services in the ZimConnect Portal,[28] where they can apply for birth certificates, register to vote, apply for a passport, pay fines, and more. Despite these developments, Zimbabwe ranks 138 out of 193

[22] GSMA. "Mobile Connectivity Index." 2021.
[23] POTRAZ. "Abridged Postal and Telecommunications Sector Report." 2023.
[24] Greens Zambasa. "Smartphone penetration rate in Zimbabwe." 2022.
[25] POTRAZ. "Abridged Postal and Telecommunications Sector Report." 2022.
[26] POTRAZ. "Postal and Telecommunications Act." 2015.
[27] World Bank. "Digital Economy for Zimbabwe." 2021.
[28] GoZ. "ZimConnect Portal."

countries on the UN E-Government Development Index (EGDI),[29] which measures three dimensions of e-government: provision of online services, telecommunication connectivity, and human capacity.

The GoZ has put forth several strategies to promote digitalization, financial inclusion, and economic development, including the National Financial Inclusion Strategy (NFIS II)[30] and Vision 2030.[31] Additionally, the GoZ through MoLAFWRD is guided by the National Development Strategy (NDS 1),[32] which emphasizes the integration of digitization within the agricultural sector.

Zimbabwe passed a landmark piece of legislation in December 2021 when, after nearly 18 months of deliberations and revisions, Zimbabwe officially enacted the Data Protection Act (DPA).[33] The act ensures data protection for data collected by data handlers both within and outside of Zimbabwe, if the processing takes place in Zimbabwe, and designates POTRAZ as a data protection authority with the power to ensure proper enforcement of the act.

The International Telecommunications Union (ITU) has an ICT regulatory tracker[34] that measures changes taking place in the ICT regulatory environment of countries worldwide. Zimbabwe has a score of 70/100, equivalent to the African region's average score. However, as shown in the figure below, ICT regulation has grown with ICT infrastructure in Zimbabwe from 2007 to 2022.

Source: ITU

[29] UN. "EGDI." 2022.
[30] RBZ. "National Financial Inclusion Strategy 2022-2026." 2022.
[31] GoZ. "Vision 2030 Documents."
[32] Republic of Zimbabwe. "National Development Strategy 1." 2021.
[33] GoZ. "Data Protection Act." 2021.
[34] ITU. "ICT Regulatory Tracker." 2022.

- *Digital Economy*

As stated in USAID's Digital Ecosystem Framework, the digital economy considers factors including ICT talent and skills, e-commerce, and DFS. The section below highlights essential aspects of the Zimbabwean digital economy. Later sections will cover DFS in more detail.

Zimbabwe scores a 4.3/10 in terms of digital skills among the population.

21.5% of the population uses a mobile phone or the internet to pay bills.

Wiley's Digital Skills Gap Index (DSGI)[35] ranks 134 economies against a suite of indicators to determine how prepared a country is with the digital skills needed for economic growth and prosperity. According to the index, Zimbabwe scores 4.3/10 in digital skills among the population, with ten being the highest score. This score is above Sub-Saharan Africa's average score of 3.4/10, placing Zimbabwe at a global ranking of 87. The GoZ has recognized the importance of continuing to build digital skills, and in 2017, the Ministry of Primary and Secondary Education (MoPSE) rolled out a new curriculum that integrated digital skills training into basic education.[36]

E-commerce in Zimbabwe is relatively nascent but continues to grow. Limited internet connectivity is a barrier to e-commerce growth, and most e-commerce activities are restricted to urban areas, with much of it taking place on social media platforms such as WhatsApp.[37] About 18 percent of the population aged 15+ owns a credit or debit card, and 21.5 percent of the population aged 15+ uses a mobile phone or internet to pay bills.[38] Some e-commerce companies in Zimbabwe include Munch Zimbabwe, Fresh in a Box, Zimall, OK Zimbabwe Limited, and Mukuru Groceries.

Despite Zimbabwe's relatively nascent e-commerce sector, COVID-19 has accelerated the adoption of e-commerce activities as people turned to online shopping due to restrictions on movement. For example, OK Zimbabwe Limited, a supermarket retailer, saw online sales increase by 300 percent during the pandemic.[39] Additionally, significant growth potential for the e-commerce industry exists in Zimbabwe due to the popularity of mobile money and digital payments, which the findings section will discuss below.

Global Trends and Learnings in Digital Agriculture

Globally, the digital agriculture landscape continues to advance as the world becomes more connected. GSMA's new report, Improving Farmer Livelihoods Through Digitised Agricultural Value Chains, offers many insights, trends, and learnings on the current state of digital

[35] Wiley. "DSGI." 2021.
[36] World Bank. "Digital Economy for Zimbabwe." 2021.
[37] Trade.gov. "Zimbabwe - Country Commercial Guide." 2022.
[38] World Bank. "Global Findex Database." 2022.
[39] Evidence Chenjerai. "Pandemic jump-starts online retail sales in Zimbabwe." 2021.

agriculture. The section below summarizes the key trends and learnings that USAID/Zimbabwe and other stakeholders can consider as they seek to leverage digital tools for the agricultural sector.

Digital advisory services are one of the most popular digital services used by farmers, agribusinesses, and cooperatives.

These stakeholders see clear benefits in using these services, such as higher crop yields, improved and increased access to information for farmers, and increased cost-efficiency for agribusinesses. Farmers or users with low digital literacy levels or limited willingness to pay for data can also use certain digital advisory services, such as SMS. This trend towards digital advisory services aligns with our findings from our interviews with Zimbabwean agricultural stakeholders, which the below sections will discuss in more detail.

Women and youth are underrepresented among users of digital agriculture services.

Women face unique barriers to accessing and using digital tools, such as low levels of digital literacy or mobile phone ownership. With women making up 70 percent of Zimbabwe's agricultural workforce and youth constituting a significant percentage of the country's population, stakeholders in Zimbabwe's agricultural ecosystem need to emphasize creating tools and services that reflect these populations' needs and preferences.

The uptake and usage of digital agriculture services scale when the services reflect SHF's diverse needs and skills.

SHFs and large-scale farmers have varying levels of digital literacy, income, and production, and digital agricultural services should reflect these differences. As SHFs are the dominant player in Zimbabwe's agricultural sector, understanding their needs, habits, and preferences is crucial to ensure that digital agriculture services work for this group.

US Global Food Security Strategy and Digital Focus

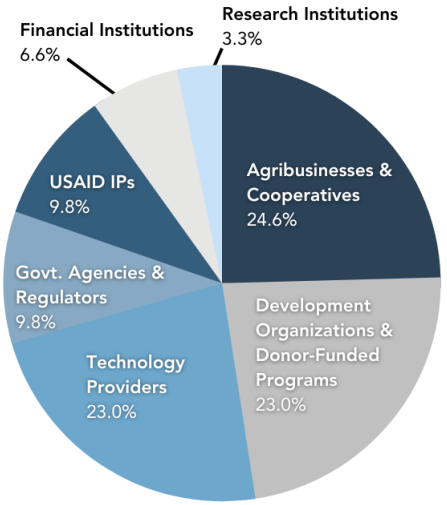
USAID's U.S. Global Food Security Strategy 2022-2026 aims at ending global hunger, poverty, and malnutrition and calls for an enhanced use and integration of digital tools and technologies in food systems. In this report, SIA has provided realistic and practical recommendations for how USAID/Zimbabwe activities can leverage digital opportunities to achieve the goals and objectives of the strategy.

Methodology

Methods

SIA commenced this study with a comprehensive literature review of over 50 desk research sources related to Zimbabwe's agricultural sector, digital connectivity and digital finance landscape, and digital agriculture solutions. The sources reviewed included reports, assessments, articles, datasets, and online websites, among others.

Key Informant Interview Participants



Beginning in February 2023, SIA sent KII invitations to 81 stakeholders, including technology providers, government agencies, financial institutions, agribusinesses, farmer-based organizations and cooperatives, research institutions, USAID IPs, and other development organizations. While our team coordinated with the stakeholders to schedule the KIIs, we developed questionnaires tailored to each stakeholder group to frame the interviews. Annex 5 provides the complete interview question sets.

Between February 13th, 2023 and March 28th, 2023, SIA conducted 61 KIIs with organizations through remote conferencing (using Google Meet and Zoom) and in-person meetings. Our team conducted 38 percent of the interviews in-person, with the majority of in-person meetings taking place in Harare. For most interviews, SIA used a structured interview format, focused on details of the digital agriculture tools interviewees used and/or developed. SIA was able to schedule and conduct interviews from all stakeholder categories, as shown in the figure above, with development organizations, technology providers, and agribusinesses being the most represented. Annex 1 provides the complete list of interviewed organizations.

Limitations

Most of the information in this report is self-reported by users, developers, and owners of digital tools and services. Because SIA had limited ability to independently verify the information, it is worth acknowledging that some responses can be skewed. In particular, developers of digital tools may be overrepresenting the reach of their products in an effort to promote their tool, capture more users or funders, or promote their organization. In responding to an assessment conducted for USAID, a major funder, it is possible that a number of respondents were incentivized to be overly positive about their products and services.

Although SIA undertook efforts to ensure a well-balanced representation of stakeholders, certain stakeholder groups, such as government agencies and financial institutions, were more hesitant to participate in the interviews. The government agencies we contacted often needed

significant time to obtain the necessary clearances for participation and faced limitations in terms of the information they were permitted to share. Financial institutions were often reluctant to share information about the performance of their financial products due to competition. SIA took these factors into account when scheduling and conducting interviews, as well as analyzing the data, to ensure that the recommendations reflected the responses we received and our independent desk research.

Taxonomy

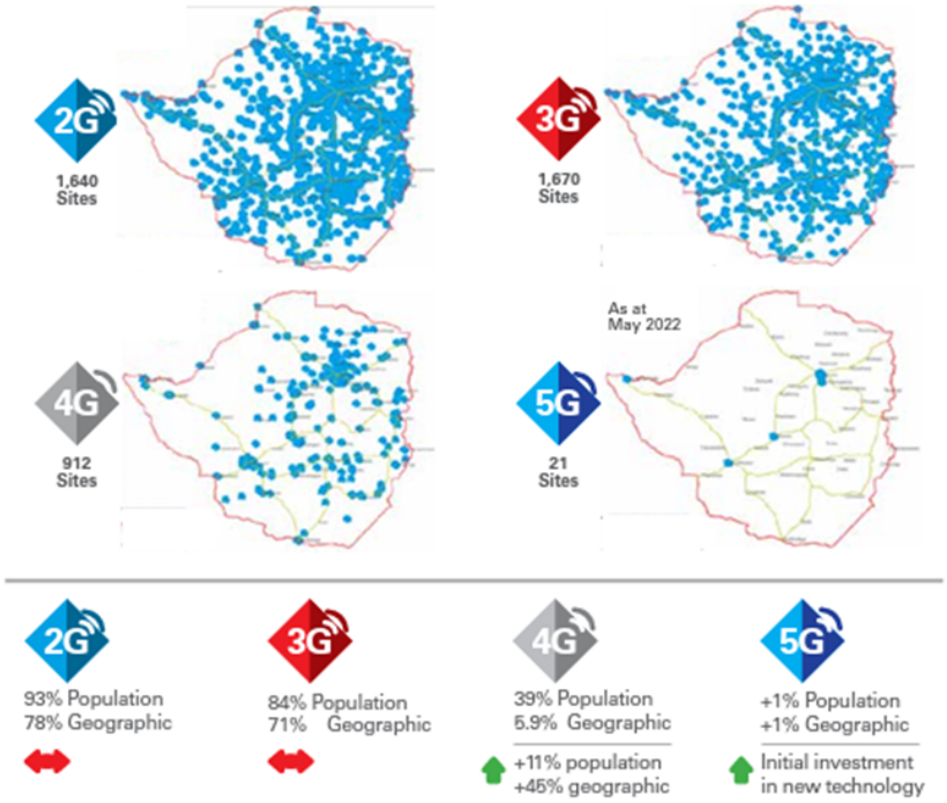
This report uses data definitions and taxonomies developed in September 2021 by the Digital Agri Hub to identify the varying use cases of digital solutions in the agricultural sector. Visit this link to see the complete list of taxonomies and definitions. Annex 2 provides a definition of each digital use case identified in Zimbabwe. Annex 4 includes a table showing the digital use cases associated with each stakeholder interviewed.

Digital Enabling Factors in Zimbabwe

Connectivity

TelOne is Zimbabwe's sole fixed telecommunication services provider and provides fixed voice and broadband services. Zimbabwe also has several Internet Service Providers (ISPs), including Liquid Telecom, Africom, and Telco.[40] There are three licensed mobile operators in Zimbabwe: the privately-owned Econet Wireless Zimbabwe and two government-owned operators, NetOne and Telecel Zimbabwe. Econet dominates the market with a 70 percent market share and an active subscriber base of almost ten million,[41] and NetOne and Telecel sit in second and third place, respectively. Data provided by Econet, as shown in the figure below, indicates that 93 percent of the population is covered by a 2G network, 84 percent by a 3G network, and 39 percent by a 4G network.[42]

[40] ZISPA. "Internet Service Providers."
[41] Chronicle. "Econet expands subscriber market share to 70 percent." 2023.
[42] Econet. Integrated Annual Report 2022. 2022.



In 2022, Econet launched 5G services in Harare. However, connectivity gaps exist between urban and rural areas, and many stakeholders interviewed cited connectivity as a challenge to the adoption of digital services in rural communities. According to POTRAZ's 2022 Q3 report, there are 9,810 mobile base stations in the country, 6,896 of which are in urban areas.[43]

Radio is a popular form of technology used to reach people living in rural areas. Of the 2.3 million households with a radio, 1.3 million of them are in rural areas.[44] Listenership is higher in rural areas than in urban areas. For example, Radio Zimbabwe, the country's oldest and most popular radio station, has 47 percent listenership in rural areas compared to 28 percent in urban areas.[45] Several development organizations interviewed have also disseminated agronomy information and best practices via the radio.

To reduce connectivity gaps, improve the population's access to ICT, and increase digital literacy, the GoZ, through POTRAZ, has been setting up digital hubs known as Containerised Village Information Centers (CVICs) in rural and marginalized areas. People who visit the hubs can receive skills training and access the internet and computers. The GoZ has established over 100 hubs around the country.[46] Additionally, the Ministry of ICT, Postal and Courier Services is currently in the process of creating a national network backbone intended to connect all

[43] POTRAZ. "Abridged Postal and Telecommunications Sector Report." 2022.
[44] Leonard Sengere. "Forget TV and the internet. Radio is how you reach Zimbabweans." 2021.
[45] Radio Zimbabwe. "About Us."
[46] The Sunday Mail. "Govt bridges urban-rural digital divide." 2020.

government offices. FAO is also conducting preliminary scoping assessments to identify potential pilot villages in Zimbabwe as part of the Digital Villages Initiative (DVI) in collaboration with MoLAFWRD.

Youth

Zimbabwe is a young country, with 62 percent of the population below 25 years old[47] and the median age being around 18 years old.[48] About 57 percent of women and 47 percent of men between the ages of 20 and 31[49] grow fruits and rear livestock, which is a much lower age than in other African countries, where the average farmer is 60 years old. However, youth in Zimbabwe face numerous challenges that prevent them from entering the agricultural sector, such as a lack of access to inputs and land due to high costs. KIIs with various stakeholders revealed that the ability to earn a profit from agricultural activities would be a driving incentive for more youth to participate in the sector. Interviewees also highlighted that because the youth are technologically-savvy, they are a key enabler to increased ICT adoption and usage in the agricultural sector.

GoZ has undertaken efforts to promote greater youth participation in agriculture and encourage innovation among young ICT players. In 2022, the government launched the Provincial Integrated Youths Skills Development Centres, where land in each province will be designated for the establishment of agricultural incubation centers. Youth who are trained at these centers will also receive inputs from the government to improve productivity, such as heifers. POTRAZ is also administering the government's ICT Innovation Revolving Fund to support digital entrepreneurship and stimulate creativity and innovation among young ICT players.

Literacy and Mobile Phone Adoption

Zimbabwe has one of the highest literacy rates in all of Africa, with an adult literacy rate of roughly 90 percent.[50] Despite the high literacy rate, many stakeholders engaged during this assessment identified digital literacy as a key barrier to the adoption of smartphones and digital services, particularly among SHFs. Larger commercial farmers often have the skills needed to use digital tools and technologies and are typically more likely to own a smartphone when compared to SHFs. Many agribusinesses use SMS and WhatsApp to answer questions received from SHFs and disseminate agronomy information, though numerous stakeholders expressed the need for increased digital literacy training among SHFs to build more awareness of digital agriculture services beyond advisory services, as well as confidence in usage.

[47] UNFPA. "Young people."
[48] Statista. "Zimbabwe: Average age of the population from 1950 to 2100." 2023.
[49] Johan Burger. "Zimbabwe makes agriculture attractive for the youth." 2021.
[50] World Bank Data. "Literacy Rate." 2021.

The cost of smartphones is also often beyond the reach of SHFs and rural customers, which led Econet to roll out an affordable 4G-enabled smartphone in 2021. The 'Kambudzi' device package, available for ZWL4000 along with six gigabytes of free data, is designed with a user-friendly interface and equipped with a long battery life to meet the needs of first-time users and customers living in rural and marginalized areas. According to Econet's 2021 annual report, this initiative led to an increase in Econet's data market share and the number of active customers.[51]

Digital Financial Services (DFS)

Zimbabwe has a well-developed payments system, with 96 percent of transactions in the formal sector conducted digitally, which represents 40 percent of the economy.[52] Financial transactions in Zimbabwe are led by mobile money providers, mainly Econet's EcoCash, NetOne's OneMoney, and Telecel's Telecash. According to the World Bank Findex, 51 percent of the total population and 47 percent of the rural population has a mobile money account.[53] EcoCash, registered as a separate entity from Econet, is the mobile money market leader, processing 99.7 percent of all mobile money transactions.[54] EcoCash's core use cases include person-to-person (P2P) payments, bill payments, merchant payments, and cash in and cash out (CICO) services. TextaCash is another low-cost mobile money service operated by CABS, a financial institution in Zimbabwe. In May 2023, Old Mutual's fintech business "Old Mutual Digital Services" launched O'mari, a mobile wallet accessible via an application, WhatsApp, and USSD that encompasses mobile money transactions, bill pay, and grocery and school fee policies. Though DFS penetration levels are considerably high, our KII with Econet revealed that limited road infrastructure and access to electricity are key challenges associated with serving rural customers throughout the country.

Supply Side Findings

Zimbabwe has a growing and innovative digital agriculture landscape, with private technology companies providing many products, technologies, and services. Several international development organizations and agribusinesses have also built and deployed their own products, such as applications, in Zimbabwe and other countries in the sub-region. The digital agriculture products and services identified span across taxonomies, encompassing multiple use cases.

The section below details the key suppliers of digital agriculture products and services in Zimbabwe. These insights are organized by the various digital agriculture taxonomies defined by the Digital Agri Hub. Annex 2 provides the relevant and applicable digital use case definitions referenced in this report, and Annex 3 includes deep dives into key digital

[51] African Financials. "Econet Wireless Zimbabwe Limited Annual Report Document." 2021.
[52] World Bank. "Digital Economy for Zimbabwe." 2021.
[53] World Bank. "Global Findex Database." 2022.
[54] World Bank. "Digital Economy for Zimbabwe." 2021.

agriculture service providers and their services. Annex 4 lists all of the digital agricultural innovations in Zimbabwe interviewed for this assessment and their associated use cases.

Advisory Services

Trends and Insights

Advisory services are the most popular type of digital agriculture tools and services that supply side actors are developing. Stakeholders such as agritech companies, agribusinesses, MNOs, and development institutions are investing in and deploying digital advisory solutions to support both SHFs and commercial farmers in Zimbabwe. Several technology providers and agribusinesses supply precision agriculture advisory services. Two agribusinesses, Bain New Holland and Agricon Equipment, specialize in the supply of high-end GPS-fitted equipment (including tractors, harvesters, and planters), while DripTech uses digital tools to support irrigation scheduling and water management. Alley Capital Group also offers location-specific drone spraying services for crops.

Precision irrigation equipment sold by DripTech

Farmer information services are being delivered over voice (such as interactive voice response, or IVR), text channels (SMS and USSD) and, increasingly, mobile applications, all of which are providing information on agricultural practices, market prices, and local weather forecasts to farmers. Econet and NetOne are the two major MNOs in Zimbabwe that have invested in farmer information services. The EcoFarmer mobile farming platform launched in 2013 by Econet Wireless is one of the earliest digital agriculture products providing information and extension services to farmers through the 144 toll-free line and *144# dial-in by Econet network users. Through these channels, callers can talk to a farming specialist for free and receive advice on crop production and marketing, tobacco, and livestock. EcoFarmer also offers a subscription service for farmers to receive tips on maize, groundnuts, tobacco, cattle, goats, bees, and sorghum. For each commodity of interest, farmers can pay weekly (US$0.15) or monthly (US$0.50). NetOne also developed "Hurudza-Umlimi Omkhulu" accessed via *140# for farmers to subscribe and get access to diverse information in the farming ecosystem. The MNOs have not only launched these services and market them effectively, but also have built

sustainable and agile partnerships with ecosystem players such as content providers, developers, and agribusinesses.

Technology providers have also developed innovations offering farmer information services. For example, Murimi 247, through its mobile platform "My Crop Manager," provides daily, actionable agronomic information to help farmers adopt climate-smart crop management practices and achieve above-average yields. Zimbabwe Mercantile Exchange (ZMX) provides real-time market data on commodity prices, price trends, bids and offers, trading volumes, and values. Several development organizations and agribusinesses have also developed applications that provide crop and livestock information, including WHH's Kurima Mari advisory application, Syngenta's "My Seeds Syngenta" application, and SeedCo's mobile application with pest and disease management tips.

Challenges

Suppliers of precision agriculture advisory services focus on commercial farmers. Suppliers of these services have determined that serving SHFs can be too complex given the high costs associated with equipment procurement and infrastructure needed to operationalize the equipment, and the limited ability and willingness of SHFs to pay. For example, the minimum viable area for Alley Capital Group to travel to and offer their services is ten hectares, which is often larger than the land that SHFs cultivate. GPS-fitted tractors supplied by Bain New Holland come with a software subscription fee of US$1,400 to US$1,700 per year, which is often beyond the reach of SHFs.

Supply side actors endure high marketing costs needed to drive initial uptake of the advisory services and maintenance costs needed to sustain user interest. Several suppliers of digital advisory services also cited the potential for farmers, particularly SHFs, to discover cheaper information sources as a threat to uptake and usage of their digital advisory services, such as the Department of Agricultural Technical and Extension Services' (AGRITEX) free in-person trainings and demonstrations, and in-person extension services provided by seed houses such as Seed Co., Pioneer, Panner, and Prime Seeds.

Market Linkage and E-Commerce

Trends and Insights

The supply of market linkage and e-commerce services in Zimbabwe have expanded in response to COVID-19 restrictions. While much of the market linkage and e-commerce services are taking place on social media platforms, including WhatsApp and Facebook, which anyone with internet access can use, several digital agriculture providers have developed similar platforms.

E-marketing and e-commerce services are among the more prevalent sub-use cases of market linkage and e-commerce services. For example, FarmHut Africa is a business-to-business agritech platform focused on bringing efficiency to the agro-supply chain by connecting 400k farmers to 270 restaurants, retailers, and vendors. Econet Wireless also launched the Ownai Online Marketplace, one of Zimbabwe's dominant marketplace platforms. Another offering comes from its sister company, EcoCash Holdings, where subscribing farmers can access an Ecofarmer Club Trading platform to sell crops and livestock via a USSD channel. Murimi 247 also offers an online store that links farmers to certified inputs suppliers who are pre-vetted by experts to ensure the farmer does not buy counterfeit inputs, and ZMX links local and international buyers and sellers via a digital marketplace.

There is a limited supply of mechanization access services in Zimbabwe. EcoFarmer's Vaya Tractor is one of the few platforms allowing farmers subscribed to Econet to hire, order, and pay for farming equipment via mobile phones by dialing *902#. Farming equipment available for hire on the platform includes tractors, rippers, sprayers, spreaders, planters and disc plows, harrows, and combine harvesters. Murimi 247 also has a mechanization platform that aims to increase easy access to farm mechanization solutions by renting tractors and farm equipment for small and large farms. There are about 4,300 farmers who are active users, 50 percent of whom are women.

Challenges

Low demand for mechanization access services among SHFs has led to limited supply. SHFs do not have a high demand for these services due to a number of factors, including limited ability and willingness to pay, awareness of the services, and technical understanding of the services. There is a need to implement more awareness campaigns that highlight the uses and benefits of these digital technologies to drive interest and uptake.

High inflation has devalued the local ZWL currency, resulting in farmers preferring to sell their products in hard currency. While some market linkage and e-commerce services leverage a multi-currency system, farmer adoption and uptake may decrease or be limited if sufficient USD is not available.

Supply Chain Management

Trends and Insights

Several companies offer agricultural supply chain management services, including logistics solutions. FarmHut Africa facilitates the transportation of produce from farmers to restaurants, and Fresh in a Box is an agribusiness that delivers food supplied by SHFs directly to customers through a network of over 300 drivers. The primary supplier of supply chain ERP solutions interviewed is FIGJAM, who designed Sales Force Automation (SFA) and Van Sales to reduce

businesses' operation times (including agribusinesses), minimize costs, and monitor field teams. Several factors, including low bandwidth networks, low data consumption and storage, the prevalence of the Android mobile operating system, and the need for intuitive user interfaces shaped the design of both SFA and Van Sales.

There are limited traceability and certification solutions available in Zimbabwe. E-Livestock Global LLC has a traceability solution for livestock, which allows a farmer to manage their herd remotely and access information about the animals including birthdate, dipping and vaccination sessions performed, and animal movement. WeEffect's centralized dairy database also can track where milk comes from, and the drugs dairy farmers administer to dairy cows. Additionally, the dairy database validates the authenticity of the milk received and can detect counterfeit products.

Challenges

Supply side actors cite low digital literacy levels as a barrier to the uptake of supply chain management solutions. FIGJAM in particular highlighted how many users of the services were new to smartphone technology, which resulted in the company designing a user interface that accounts for varying levels of digital literacy.

Behavior changes are required for customer buy-in and adoption of supply chain management solutions. Several providers of supply chain management services indicated that customers occasionally push back against the adoption of technology, particularly if previous supply chain management systems did not use technology. FIGJAM has noticed this pushback, particularly among field teams.

Finance

Trends and Insights

With free account opening, no monthly fees, and services (including payments, savings, insurance, and loans) accessible via USSD, agent networks, and mobile applications, farmers prefer mobile money wallets over bank accounts. EcoCash is the most popular mobile money platform, enabling users to link their mobile wallets to their bank accounts, save money, access micro-loans and insurance, and send money to pay bills, people, and businesses. EcoCash's agent network is the largest agent network of all the mobile money providers, with over 30,000 agents that are dispersed across both urban and rural areas. Users can save money via EcoCash Save, which offers different savings plans with incentives including the ability to accumulate interest and no account fees. EcoCash Save users can also qualify for micro-loans by saving a minimum of US$5 for three months. There is zero percent interest levied on loan repayment and an admin fee for loan processing of 25 percent. EcoSure is a funeral insurance product with policies that can be purchased for as little as US$0.50. Additionally, EcoCash has begun focusing on youth and launched an EcoCash Junior Wallet which enables children between the

ages of nine to 18 to have their own mobile money account that is associated with their parent's EcoCash account.

EcoFarmer, Econet's mobile farming platform for farmers and agribusinesses, is linked with EcoCash. Users are required to register for EcoCash before signing up for EcoFarmer. Aside from the advisory and mechanization services discussed above, EcoFarmer previously provided weather-indexed insurance for SHFs. SHFs could insure their maize production inputs from US$25 to US$625 per season at a premium of ten percent via their mobile phone. However, the weather-indexed insurance is currently inactive due to challenges faced by their weather data collection partner.

NetOne's OneMoney is the second-most popular mobile money service in Zimbabwe. Aside from offering payments, OneMoney offers the ability to purchase vehicle insurance and collateral-free loans of up to US$50 via USSD. Pay-as-you-go (PAYG) financing is another payment solution being explored in Zimbabwe. The United States African Development Foundation (USADF) funded Natfort Energy, a Zimbabwean solar energy product provider, to develop a PAYG financing technology that allows rural farmers to pay for solar home systems and solar water pumps in weekly installments, or whenever they are financially liquid. Farmers can pay their installments via mobile money.

SHFs often cannot provide the collateral requirements for traditional credit products offered by banks. Stanbic Bank offers agricultural input financing, mainly for commercial tobacco farmers, and asset financing for agricultural equipment. Tobacco loans have a period of 14 months with USD interest rates of 12 percent. Commercial Bank Zimbabwe (CBZ) also provides input loans to 1,300 SHFs and 600 commercial farmers and conducts its own credit assessments. For existing and returning customers, no collateral is required, but new customers must show title deeds or commercial properties in their name as a form of collateral security. Agricultural input loans have varying interest rates depending on the season, and the most recent summer loans were charged at 14.5 percent per annum.

Banks and insurance companies provide agricultural insurance for SHFs and commercial farmers. Old Mutual offers various types of crop insurance including multiple peril crop insurance (MPCI), weather index insurance, and area yield index insurance. SHFs primarily adopt the weather index insurance, whereas commercial farmers adopt the area yield index insurance. Insurance covers a crop's production season, and the premiums start at ten percent. Stanbic Bank requires that tobacco farmers who receive input loans purchase hail insurance. CBZ has 1,520 agriculture insurance customers, and premiums can start from a minimum of five hectares for existing customers and 50 hectares for new customers. CBZ insures about 30,000 hectares of winter wheat and 50,000 hectares of summer maize and soybeans.

Challenges

Delivering insurance products to SHFs may not be profitable for larger financial institutions. Old Mutual cited a concern that not enough SHFs are on board with their crop and livestock insurance products for the institution to be profitable. Financial institutions may not see the value in developing insurance products catered to SHFs.

Ecosystem Support

Trends and Insights

This assessment identified several private sector organizations that provide important digital agriculture ecosystem support services which enable other digital agriculture products and services to function. Umojalands Systems is a core banking platform for microfinance companies to access farmer data and de-risk agricultural credits and lending using satellite imagery and artificial intelligence. Through USSD, farmers can digitally apply for loans and become visible on the platform. The company collects alternative credit data such as social data, credit psychometry for farmers, financial behaviors, and geolocations, which are aggregated into a credit score. Financiers, through a web application, can connect to farmer data and track progress on the farms via a satellite-based crop monitoring solution. The company has on-boarded over 10,500 SHFs.

Elixir Technologies is a technology company that has developed mobile and web applications for clients in the agricultural sector, including for Mukushi Seeds and SeedCo to monitor seed growers and distributors. Elixir Technologies also developed Biztrack, funded by APT, which is an application that enables farmers to track and manage financial transactions, enter costs and revenues, and receive business performance insights.

UNDP has also provided ecosystem support services in Zimbabwe. UNDP's Zimbabwe Resilience Building Fund (ZRBF) previously supported MoLAFWRD by purchasing and installing 14 weather stations to enable the Meteorological Services Department to collect weather data for early decision-making. The UNDP Accelerator Lab in Zimbabwe also funds and tests innovative solutions with partners in the agriculture sector, particularly in the areas of farmer advisory systems, early warning systems, and market linkages.

Several government agencies provide ecosystem support services. The Ministry of ICT, Postal, and Courier Services plays a key role in training government workers on the usage of ICT tools. In 2022, this Ministry trained 2,800 civil servants on a course to build foundational digital skills. The Ministry also supported MoLAFWRD to develop the Agricultural Information Management System (AIMS). AIMS is a database of various resources that provides the Ministry with easy access to accurate data and information related to the agricultural sector. Additionally, the Department of Livestock and Veterinary Services within MoLAFWRD hosts an online dairy database, developed by WeEffect, to engage the value chain actors (including farmer organizations, extension workers, and dairy suppliers) on joint strategic planning. The database

includes information about farmer locations, the number of dairy cows owned, milk collection centers, and milk production volumes.

Challenges

Government agencies that collect data from the agriculture sector sometimes face human resource shortages. Ideally, the organizations should have a presence in each district to collect data, but this is not always the case. Additionally, training field agents on how to collect data is expensive. MoLAFWRD cited high costs as a challenge when they funded the nationwide training program for extension workers to collect data for the national dairy database.

The rate that technology is growing outpaces the development of regulations that protect the public. Due to the lengthy process by which regulations are developed and issued, some products and services come to the market without any regulatory framework. For example, the Ministry of ICT, Postal and Courier Services has been working on a bill to dispose of ICT gadgets and tools for three years, but the bill has yet to be passed. Zimbabwe also did not have a data protection law until the DPA passed in 2021, which still has critical gaps to fill, particularly in the notification requirements to subjects of data breaches and circumstances where data transfer to countries outside of Zimbabwe is unauthorized.

How Digital Agriculture Suppliers are Responding to Risks

Using digital technologies in the agriculture sector can introduce an array of benefits as discussed above, but it does not come without risks. This section identifies some of the common risks associated with digital tools and services, pulled from various sources including the USAID Cybersecurity Primer and the USAID Digital Strategy, as well as a summary of how suppliers of these tools and services in Zimbabwe are mitigating each risk.

Interruptions in Service Delivery

The reliability of payment systems and mobile networks is critical to ensuring the smooth delivery of digital services. Interruptions in service delivery and weakened network performance can not only delay digital transactions from going through but can discourage digital tool adoption and cause distrust among existing users.[55] This risk is especially important in the Zimbabwean context, as network connectivity and service interruptions have been cited as a challenge to digital tool adoption among supply and demand side actors. Many digital agriculture suppliers in Zimbabwe have accounted for potential network interruptions in the service design by developing products and services with offline capabilities:

[55] CGAP. "Doing Digital Finance Right: The Case for Stronger Mitigation of Customer Risks." 2015.

- FIGJAM's two solutions, SFA and Van Sales, have offline capabilities and can work on poor or low-bandwidth networks.
- FarmHut developed USSD, mobile, and web-based solutions to cater to users with varying access to connectivity.
- E-Livestock Global's cattle traceability solution and the Biztrack application developed by Agricultural Partnerships Trust (APT) both have offline capabilities.

Risk of Exclusion

The device requirements needed for digital tools and technologies can affect adoption and usage. Solutions that require a smartphone risk leaving behind people who do not have access to one, especially in Zimbabwe where smartphone penetration is not yet ubiquitous and remains limited among SHFs due to high costs. Several suppliers are taking steps to mitigate this risk of exclusion by introducing solutions that can be accessed and used on basic phones:

- Econet's EcoCash, NetOne's OneMoney, and Telecel's Telecash are accessible via USSD, allowing customers with basic phones to perform mobile money transactions.
- Users can self-register for the Vaya Digital Farmer platform through USSD, as well as access a number of services, such as mechanization services and agronomic advice.
- Farmers using CBZ's Agro-Yield to receive input loans can check their input balance by using a USSD short code.

Threats to Cybersecurity and Privacy

Using digital tools and technologies can put users at risk of cyber threats, information theft, and privacy violations. Many digital agriculture suppliers have developed features for their products or have customer-facing resources in place to mitigate potential (or actual) privacy risks and threats to cybersecurity:

- Many applications and services have login features for security such as usernames, passwords, and PINs including ZMX, Vaya Digital Farmer, Murimi 247, FIGJAM, FarmHut, EcoCash, and NetOne.
- Most providers have dedicated customer feedback and support mechanisms to address customer inquiries or issues, such as call centers and toll-free numbers, chatbots and WhatsApp numbers, and in-person field staff. Providers also instruct customers on how to engage with customer support mechanisms, which helps mitigate the risk of

engaging with fraudulent actors (for example, instructing customers to save the call center number as a contact).

- ZMX has a toll-free number and a chatbot to respond to inquiries.
- Murmi 247 has a dedicated customer service team with a call center and WhatsApp support services.
- Knowledge Transfer Africa (KTA) has a call center for customer inquiries regarding the eMKambo digital market pricing platform.
- FIGJAM offers numerous support mechanisms that are monitored 24/7 including WhatsApp, email, a phone line, and SMS.
- FarmHut offers WhatsApp support, a call center, and in-person field support if needed.

Demand Side Findings

COVID-19 has accelerated the use of digital agriculture products and services by demand side actors in Zimbabwe. Many agribusinesses, farmer-based organizations, cooperatives, and development partners adopted and introduced digital tools and services to reach their farmers and program participants due to lockdowns and restrictions on movement.

Advisory services are the most popular taxonomy adopted by demand side actors. Since the start of the pandemic, several organizations leveraged virtual platforms such as Zoom and Facebook Live to deliver agronomy tips and trainings to customers, as well as amplified their WhatsApp usage for information dissemination. Given the lower rates of smartphone ownership among SHFs and in rural areas, organizations had to implement a variety of technologies to reach all clients and customers with varying levels of device ownership and digital literacy. The most popular tools that are used for advisory services include SMS, WhatsApp, social media, and mobile applications. Some agribusiness and development programs also leveraged radio and television to reach out to remote areas that have limited or no mobile connectivity.

The following section examines the usage of digital agriculture products and services among demand side stakeholders. These insights are organized by the type of organization and discuss the various digital agriculture taxonomies, though not all taxonomy categories are addressed.

Agribusinesses, Farmer-Based Organizations, and Cooperatives Deep Dive

Advisory Services Usage

The majority of the interviewed agribusinesses, farmer-based organizations, and cooperatives have an active social media presence on platforms including Facebook, Twitter, Instagram, and YouTube. These organizations use social media to market themselves and to reach their customers by answering questions and offering crop advice. WhatsApp is the most widely-used platform by agribusinesses because it is popular, cheap to use, and offers two-way communication and instant feedback. Many agribusinesses have branch-specific WhatsApp groups, and their employees also use their personal direct lines to create groups for direct communication with customers.

The COVID-19 lockdowns pushed some agribusinesses to be more innovative. Many agribusinesses started to use virtual platforms like Zoom and Facebook Live to host virtual field days that allowed commercial farmers to share their learnings with each other and receive technical farming support. Though these tools can have high cost implications for agribusinesses, they enable participation from across districts, provinces, and even countries.

Bulk SMS messaging is another widely-used method by stakeholders to disseminate information on prices, upcoming announcements, promotions, and farming advice. This communication method is frequently used in rural areas where internet penetration is limited and low income levels prevent SHFs from purchasing data needed to access the internet. A major limitation of bulk SMS is that it does not offer a feedback loop between the organizations and the farmers.

Some agribusinesses are using radio and television to communicate with customers who have challenges accessing the internet or who do not own mobile phones. Given the varying income and digital literacy levels of farmers, internet connectivity, and ages of farmers, it is important for agribusinesses to segment their customers and map the best digital tools to use for each segment.

Though the adoption of mobile phone applications exists among farmers, the adoption rate is low relative to the number of farmers in Zimbabwe, as low digital literacy levels and slow internet speeds in rural areas hinder adoption. For example, Farmshop, an agribusiness that supplies inputs, once partnered with WHH, which developed the Kurima Mari mobile farming application. In each store, Farmshop put out a tablet installed with the application, but farmer uptake was low.

Supply Chain Management Usage

Zimbabwe Super Seeds is the only cooperative engaged that uses FIGJAM's SFA solution. The solution allows Zimbabwe Super Seeds' sales managers to monitor the sales representatives

and merchandisers that will be located in major seed distribution outlets. Zimbabwe Super Seeds adopted this solution to improve its stock management, provide immediate support to sales representatives, and reduce operational costs.

Finance Usage

Zimbabwe Super Seeds uses the CABS TextaCash platform for farmer transactions. Previously, many of their farmers were not banked, and the CABS TextaCash platform helped to open accounts and receive payments for their raw material supply to Zimbabwe Super Seeds. The cooperative is processing approximately US$1.5 million per year through the platform.

Several demand side stakeholders accept farmer payments for inputs through EcoCash. One farmer-based organization in particular, the Zimbabwe Farmers Union (ZFU), once partnered with Econet to create what is now known as the ZFU EcoFarmer Combo. By purchasing this package, farmers can access a suite of services including EcoSure funeral coverage, ZFU membership, access to discounted inputs at registered agro-dealers, and crop tips. Farmers can subscribe to this package for a minimum of ZWL10 (almost US$0.20 with current rates) per month. Though the bundle is still advertised online, it is currently under review to be relaunched, and ZFU no longer actively promotes it as the union felt that the services provided in the bundle were not agreed upon by both ZFU and Econet.

USAID IPs Deep Dive

SIA interviewed the following USAID IPs for this assessment:

1. ECODIT, the IP of the Resilience through Accelerating New Community-based Holistic Outcomes for Resource Sustainability (Resilience ANCHORS) Activity. The Resilience ANCHORS Activity is a five-year project that aims to build the capacity of communities and local partners on the governance of sustainable natural resources.
2. Foundations for Farming (FfF), a subcontractor to ECODIT. FfF is a Zimbabwe-based NGO that trains communities and government extension staff in sustainable nature-based agricultural methods.
3. Cultivating New Frontiers in Agriculture (CNFA), the IP of the Amalima Loko Project. The Amalima Loko Project is designed to improve food security in Zimbabwe through increased access to food and sustainable watershed management.
4. Chemonics, the IP of the Fostering Agribusiness for Resilient Markets (FARM) Activity. The FARM Activity aims to address humanitarian and food security needs by increasing SHFs' incomes and generating income for other community members through employment in the agricultural sector.

5. CARE, the IP of the Takunda project. The project's goal is to create sustainable, equitable, nutritious, and resilient food and income security in the Masvingo and Manicaland Provinces through training and support.

Advisory Services Usage

All USAID IPs engaged are using digital channels like WhatsApp to disseminate information to farmers, many of whom have at least one smartphone per household. Some IPs have value chain-specific WhatsApp groups where they share agronomy tips, market price information, and other agricultural information. Chemonics also uses a bulk SMS platform to send reminders to farmers on best practices, which are timed with the growing cycle of the crops. IPs cited the limited access to extension services among women and youth, the inability to conduct physical meetings during COVID-19, and the ability to reach more SHFs as the primary reasons for adopting these digital advisory channels.

ECODIT's subcontractor, FfF, deploys several digital advisory tools to reach farmers. In 2020 and 2021, FfF did a national blitz on their sustainable nature-based agriculture methods (depicted in the image on the left) via print media, radio, TV, and WhatsApp. FfF shared that 60 percent of the SHFs who implemented their agricultural methods in 2021 were trained remotely via these various methods. These training methods appeared to be successful, as Zimbabwe had the highest maize yield in 20 years in the 2021 season[56], which was the first time the country was food secure in two decades. FAO also estimated that the FfF method made nine million people food secure during COVID-19.

Aside from using WhatsApp, FfF, through support from the Resilience ANCHORS Activity, is piloting the dissemination of agricultural information through Raspberry Pi devices. Developed by Arizona State University, the Raspberry Pi devices are weather-proof and solar-powered, and host FfF's training videos (which are also accessible on YouTube). The devices emit a WiFi signal, and users within 30 to 50 meters of the device can connect to the WiFi network to access the videos. These devices enable SHFs without access to the internet to watch training videos for free, as long as they have a smartphone or Wi-Fi-enabled device. FfF aims to roll out 35 Raspberry Pi devices, which will reach 5,000 community members.

[56] Fungai Mavesere and Beauty Dzawanda. "Effectiveness of Pfumvudza as a resilient strategy against drought impacts in rural communities of Zimbabwe." 2022.

Raspberry Pi used by FfF

ECODIT is also engaged in precision agriculture through the use of geographic information systems (GIS). In four wards, ECODIT is mapping key features of interest, collected via GPS, for the Savé Valley Conservancy landscape development. The data collected and analyzed through GPS and GIS will be used to support the development and implementation of ward-level Land Use Plans (LUPs) in Nyangambe and Devure.

CARE has had preliminary engagements with Econet and Viamo to provide e-extension services for farmers. CNFA also previously considered using EcoFarmer and eMKambo to disseminate information related to weather, agronomy, and market prices. However, farmers expressed limited willingness to pay, especially for the weather information. CNFA also cited concerns that farmer adoption of digital services and tools would cease after the project ends.

Ecosystem Support Services Usage

Most USAID IPs use open-source tools and software for data collection, analysis, and reporting. FfF promotes the use of the Tree of Life smartphone application, developed by a Dutch company, among FfF trainers and field staff. Aside from having links to the FfF training videos and the training manuals, field staff can collect farmer data including the coordinates of the farm, the farmer's name and picture, and record how much land the farmer has used. However, uptake of the application has been limited among trainers and field staff. Although FfF makes the application compulsory to download, many field staff and farmers prefer to record data manually as opposed to digitally.

ECODIT, through their subcontractor Social Learning Innovation (SLI), conducted a baseline survey using ODK tools. ODK is an open-source set of tools that allows users to collect data using Android mobile devices and submit data to an online server, even in areas without an internet connection or mobile carrier service at the time of data collection. ECODIT's internal monitoring and evaluation team continues to use ODK to collect and analyze project data. Similarly, Chemonics used the open-source data collection platform called KoboToolbox to collect farmer baseline data including GPS locations, production statistics, and incomes. The

monitoring and evaluation team also uses the tools to collect and analyze program-related data. Like ODK, the tools in KoboToolbox can be used both offline and online.

Development Organizations Deep Dive

Advisory Services Usage

In addition to USAID IPs, many development organizations that have programs in Zimbabwe's agriculture sector leverage digital advisory tools to reach program participants and disseminate information. WhatsApp and SMS are widely-used channels for disseminating training information and content, with many organizations having value chain-specific WhatsApp groups (oftentimes used for two-way communications) and using bulk SMS platforms to send out tips on best farming practices that are timed with the crop cycles. WHH and APT in particular have used the Infobip bulk SMS platform to send messages with farming content generated by their organizations. Aside from WhatsApp and SMS, several programs have made use of mobile applications, particularly the Kurima Mari application developed by WHH including the Zimbabwe Agricultural Growth Programme (ZAGP) and UNDP ZRBF.

WILD Africa, an organization working in the wildlife and conservation sectors, previously used precision agriculture technologies, including GIS and satellite imagery, to map changes in land use over time, but the cost of obtaining the data was high. Additionally, there is a limited understanding of where and how to get the data in a timely manner so that it can be used for real-time decision-making. Many of the development organizations also cited concerns about costs and the sustainability of digital tools post-project, which influences their willingness to adopt other digital technologies beyond advisory services.

Financial Services Usage

Insurance is a sub-use case adopted in development programs, though uptake is still limited. Old Mutual is piloting weather index insurance policies with farmers involved in ongoing development projects in Zimbabwe implemented by WFP, TechnoServe, and SNV Netherlands Development Organisation. From Technoserve's programming, 400 coffee farmers are insured against wind damage and 8,000 households from WFP's programming are insured, with the projects initially bearing the costs followed by a gradual transition to shift the costs to the farmers. Limited willingness to pay for insurance products by SHFs remains a key barrier to uptake.

Development organizations interviewed do promote digital payment methods, such as EcoCash. However, the changing policy environment around mobile money has led to a distrust in these digital payment channels among farmers, causing many farmers to have a preference for cash transactions.

Though some financial institutions provide input financing to farmers, it is not in the context of development programming, and commercial farmers are the primary focus. Less focus is channeled towards SHFs since they lack the collateral needed to back credit facilities and due to the unpredictable nature of farming. For instance, Stanbic Bank currently provides agriculture input financing to 534 commercial farmers with an interest rate of 12 percent in USD and 85 percent in ZWL. Programming that improves SHFs' confidence in the finance and banking sector, as well as digital and financial literacy, could facilitate greater adoption of financial products and services.

Ecosystem Support Services Usage

Organizations operating in the wildlife and conservation sectors commonly use digital tools to collect and analyze data. WILD Africa and WCA are two organizations using such tools, including ODK and the open-source SMART. Wildlife officers at WILD Africa currently use the SMART mobile application, available online and offline, to collect data on tourism and incidences of human-wildlife conflict. This data is then fed into a central database where the team can perform analyses and data disaggregation, as well as share the data with external stakeholders such as law enforcement officers. WCA collects similar data using ODK, but is looking to switch to SMART as the tool has more flexibility and analysis capabilities, such as the ability to create maps and graphs. Interviews revealed that SMART is the most well-known and preferred data collection and analysis tool among the wildlife and conservation sectors.

Key Challenges Affecting Demand Side Adoption and Usage

Many SHFs have limited knowledge and capacity to use digital tools, especially older farmers. Some agribusiness expressed that the low digital literacy levels have resulted in a mismatch between the technology available on the market, and what farmers understand and can use. This mismatch is compounded by low smartphone device ownership and access to affordable smartphone devices by rural farmers. The interviews revealed that many rural communities have ownership to feature phones that are affordable and are perceived to have a better battery life than smartphones. However, multiple companies interviewed are of the view that Zimbabwe's high literacy rate and number of mobile connections could be leveraged to improve users' comfortability using digital tools.

Access to finance is a challenge, especially for the majority of SHFs who do not have the immovable collateral that is required by the banks for lending. Lack of suitable financing products is another challenge, as the current funding mechanisms are mainly short-term seasonal funding which often comes at a very high cost. Given the prevailing economic environment in Zimbabwe and the lack of access to finance, technologies such as precision agriculture technology, which require a substantial investment, remain inaccessible to small-scale farmers. Additionally, Zimbabwe's agricultural sector is still lagging in terms of mechanization, which limits commercial production and opportunities for generating incomes

that could be channeled into investment in digital agriculture tools. This partly explains the low uptake of precision agriculture services.

The high cost of mobile data is cited as a key barrier affecting the adoption of digital tools among both SHFs and commercial farmers. This sentiment is consistent with available pricing data on mobile broadband, where Zimbabwe ranks 186 out of 233 economies in terms of the cost and affordability of 1GB of mobile data. The high cost of the internet is also affecting auctioneers like CC Sales to conduct remote online auctions in rural areas, which affects farmers' access to markets.

Some farmers are not willing to pay for advisory services such as weather information services. Platforms like WhatsApp offer an alternative channel for SHFs to freely access information, which leads to a low willingness to pay for some advisory services. Most MNOs offer WhatsApp data bundles for purchase, which are cheaper than the cost of surfing online or using a mobile application. More research is needed to better understand the needs, preferences, and habits of farmers to ensure that products and services developed meet their needs and bring value. For example, given that Zimbabwe's agriculture sector will be affected by climate change and unpredictable weather patterns, SHFs may value tools and services that include early warning systems so that they can prepare in advance for potential hazards and risks. Researching SHF preferences could inform their appetite (or lack thereof) to pay for such a service.

Farmer access to market information remains a major challenge in the sector. Technology could play a key role in disseminating real-time data on market prices, quality, and volume requirements to farmers.

Although mobile network coverage is increasing, many agribusinesses and development partners highlighted that some rural areas still do not have connectivity and access to the internet. Electricity outages were cited as one of the key contributing factors to poor connectivity, which has affected the adoption of digital tools. One agribusiness, CC Sales, was particularly affected by connectivity challenges, as they rely on connectivity to conduct live livestock auctions. According to CC Sales, good internet service was only available within a 15-kilometer radius of major towns, thus excluding the rural farmers from participating in remote auctions. SeedCo, an agribusiness that uses virtual platforms for field days and virtual field tours to educate their customers, has often failed to run the platforms due to poor connectivity.

The sustainability of digital tools post-project is a key concern cited by development partners. Many development partners are worried that digital tool usage will cease after the project ends, as most projects end without putting in place a sustainability plan. However, interviews clearly revealed that the development sector is playing a critical role in raising awareness about digital tools. More sustainability plans and partnerships with the private sector are needed to ensure that the digital tools continue to work without the project support.

Conclusion and Recommendations

The digital agriculture landscape in Zimbabwe has evolved over the years, with a variety of use cases present. Many digital agriculture tools and services are driven by donor and private sector partnerships, of which Elixir Technologies, FarmHut, KTA, Econet, TelOne, and E-livestock Global LLC, among others, have been key private sector players in the space. Donor organizations have also funded and promoted digital technologies, such as advisory services, used to disseminate agricultural messaging to farmers. Community-based radio stations and SMS are popular tools deployed by agribusinesses and farmer-based organizations to deliver information to their rural farmers.

It is clear that some digital technologies do not reach a scale-up stage as adoption and usage diminish due to the end of development program funding and the unwillingness of farmers to pay for the services. Many businesses and organizations experience their technology leaving the market after the program ends.

Donors, including USAID, should focus on financing digital technologies that have the propensity to scale and a developed roadmap to become commercially viable. To close, the below summarizes the key recommendations for USAID/Zimbabwe activities from the aspect of supply, demand, and supporting ecosystems.

Supply Side Recommendations

Recommendation 1: Leverage Public-Private Partnerships to Promote Offline Digital Solutions.

Two key barriers to the adoption and usage of digital tools and services among rural farmers include connectivity challenges in rural areas and high internet costs. Programs implemented by USAID IPs can consider leveraging offline digital solutions to disseminate content and information to farmers in remote areas of the country.

The Raspberry Pi device is an example of an offline solution that FfF is currently piloting. It is a weatherproof, solar-powered device developed by Arizona State University that allows farmers to connect to the Wi-Fi signal and watch FfF's training videos from their own smartphone or Wi-Fi-enabled device for free. The device connects to 30 users at a time.

Recommendation 2: Encourage the Development of Digital Products and Services with Potential for Commercial Viability.

The usage of many digital solutions ends after pilot phases without a commercially viable plan to scale up uptake and usage. To push innovations beyond the pilot phase, USAID/Zimbabwe,

as part of current and future programming, could leverage public-private partnerships to promote digital innovations and provide technical assistance to build digital solutions beyond pilots toward commercial viability. Any digital agriculture solution that development partners wish to promote should be sourced through a private sector company that identifies the agricultural sector as a core of its business, intends to deliver the service to actors in the agricultural sector, or has the willingness to expand to the agricultural sector, with an accompanying roadmap for the expansion. Solutions should also be market-driven and priced according to end users' willingness and ability to pay.

Recommendation 3: Institute Incentive-Based Risk Sharing for Agricultural Lending.

The volatility of the agriculture sector makes financing unattractive for financial service providers such as Stanbic Bank and other commercial banks and financial institutions. To de-risk agricultural financing and stimulate increased lending by digital finance providers, the GoZ should institute a body to lead the provision of credit risk guarantees to providers. This body will increase lending to agricultural value chain actors, especially SHFs and commercial farmers, and enable them to utilize digital financial tools and technologies available for the agricultural sector.

We suggest that MoLAFWRD should spearhead advocacy with RBZ to institute the formation of the Zimbabwe Incentive-Based Risk Sharing for Agricultural Lending Agency to de-risk agricultural financing. This agency will strengthen the capacity of financial service providers to assess, structure, and manage agricultural lending. In support of these efforts, USAID/Zimbabwe could encourage the formation of a CoP that will liaise with other agricultural donor organizations for buy-in to develop a policy roadmap for submission to MoLAFWRD for consideration, as well as facilitate onward discussions with other industry players like RBZ and financial institutions on the approach to develop and implement the lending body.

Recommendation 4: Encourage Technology Providers to Target the Agricultural Sector and SHFs through Tax Incentives.

Agriculture remains the engine of growth for the Zimbabwean economy, with almost 14 percent contribution to GDP, 70 percent employed by the sector, and 60 percent contribution of raw materials.[57] To promote innovation and growth of digital agriculture solutions, GoZ can consider enacting tax incentives for companies and organizations developing services that drive rural adoption, especially among farmers and other agricultural value chain actors. These tax incentives will motivate technology service providers to deploy digital technologies to unserved and underserved rural communities. The GoZ previously introduced a similar tax incentive scheme for companies that employed youth under 30 to generate more jobs[58], setting a precedent that can apply to the digital agriculture sector.

[57] MFA. "Zimbabwe in Brief."
[58] Zimbabwe Revenue Authority. "Youth Employment Tax Incentive." 2020.

Through the same CoP, USAID/Zimbabwe should consider working with their agriculture IPs, other donor organizations, and digital solution providers to develop and submit a tax incentive policy roadmap to POTRAZ for consideration. Additionally, to prompt digital entrepreneurship, USAID/Zimbabwe could review existing grants to channel resources to start-ups at the proof-of-concept and scale-up stages for youth-led technology solutions committed to rural farmers. To allocate funding to these grants, USAID/Zimbabwe could evaluate the start-up's sustainability plan, revenue model, customer onboarding plan, partnerships, business case, and cost-share willingness to identify any potential risks before committing funds.

Recommendation 5: Promote Coordination Among Agricultural Donors and Create Opportunities for Providers to Showcase Their Products.

We suggest that every quarter, the CoP mentioned in recommendation three should hold discussions on prevailing digital products and services that their respective IPs are adopting. These discussions will create cordial synergies and reduce duplication of funding efforts on similar digital innovations. Creating greater coordination among donors will foster the scale-up of digital agriculture solutions programming and sustainability of service delivery to farmers.

USAID/Zimbabwe can serve as a convener to work with other organizations to raise funds to run these stakeholder dialogues. USAID/Zimbabwe could liaise with other stakeholders to align on dates and manage virtual or in-person meetings where digital agricultural innovators can present their products and services for buy-ins and partnerships, such as through the Market Linkage Association. Not only will this allow service providers to share successes and developments in the digital agriculture space, but it will enable donors to stay current on digital innovations in the sector, which can help inform funding priorities.

Recommendation 6: Vet Sustainability Plans from Technology Service Providers

USAID/Zimbabwe should encourage IPs to vet sustainability or business plans from technology providers before contracting them for their programming. By vetting sustainability or business plans, USAID/Zimbabwe can ensure that there is a roadmap for achieving long-term goals, product delivery sustainability, and strategies in the areas of finance, sales and marketing, product design and development, partnerships, technical delivery, a business case, and revenue growth of the providers.

USAID IPs should also seek to understand the context under which each technology was developed and deployed, including the digital literacy requirements of intended users, device and connectivity requirements, and the socio-economic status of intended users. Understanding these factors will help USAID IPs determine if the technology reflects their project context and how it can be effectively applied or adapted in programming. This recommendation reflects concerns cited by many IPs and development organizations that usage of digital tools and technologies will cease once a program ends due to a lack of sustainability or relevance among users.

Demand Side Recommendations

Recommendation 1: Implement Digital Literacy and DFL Campaigns.

EcoCash, NetOne, Stanbic Bank, and others have mobile financial services that could easily transcend to benefit rural populations. Implementing programs that focus on building the capacity of SHFs on digital literacy and DFL can help create awareness and build confidence in DFS offered in Zimbabwe, such as savings, payments, and credit, as well as other digital tools developed for the agriculture sector. For instance, SIA developed an open-source and women-centric digital financial literacy campaign in English, French, Swahili, and other local languages. Anyone can adapt the content to reflect specific DFS providers' offerings or local languages in Zimbabwe for adoption by agricultural value chain actors, including women and youth.

Basic digital literacy campaigns could cover topics including basic phone numeration, navigation, and digital platforms education and include practical steps to encourage the adoption and uptake of digital devices. A typical example is the free Mobile Internet Skills Training Toolkit developed by GSMA, which teaches people the basic skills to access and use mobile internet. USAID/Zimbabwe could encourage its activities and IPs to incorporate digital literacy and DFL topics into existing trainings. Conversely, IPs and activities could provide digital literacy and DFL content they develop to digital agriculture service providers using digital technologies.

Recommendation 2: Increase Awareness of Digital Agriculture Technologies Among IPs.

USAID/Zimbabwe should consider facilitating discussions and coordination among development organizations and the private sector to share lessons and experiences with digital tool adoption and usage. These discussions could also help ensure that providers develop digital agriculture services in line with the needs of excluded populations. The Mission could also do referrals of existing digital agriculture technologies stipulated in this report where IPs will, on their own, approach digital agriculture service providers to identify digital tools that have gained traction from SHFs. These referrals will enable IPs to strategize, request sustainability or business plans, align, collaborate, and implement with the private sector for scale and sustainability. IPs should conduct their own due diligence to ensure that the technology aligns with programming needs by examining the successes, clientele base, risks, challenges, and mitigation strategies associated with the technologies and providers.

Recommendation 3: Increase Access to Affordable Financing for Youth and Women.

Piloting digital savings and micro-loan initiatives with lower interest rates could be an opportunity to improve access to finance for SHFs in Zimbabwe, particularly young SHFs and women. Many stakeholders interviewed, including Farmshop, HDC, and Bain New Holland, stated that access to finance is a major setback for SHFs to access some digital technologies and services introduced into the market. The development of blended finance initiatives by financial institutions and donor organizations that accumulate funding from both private and public sector players for women and youth farmers could reduce issues around access to finance. We suggest that USAID/Zimbabwe include blended finance initiatives in future programming to make financing available for farmers who do not typically have collateral, which will make them better positioned to access digital agriculture technologies that they previously could not benefit from.

Ecosystem Support Recommendations

Recommendation 1: Encourage Usage of SMART for Data Collection Among IPs Working in Wildlife and Conservation.

Several development organizations in the wildlife, conservation, and tourism industries, including WILD Africa and WCA, attested to the need to deploy SMART for data collection and analysis. Organizations cited more benefits of SMART when compared to other data collection tools, such as ODK, including increased functionalities and improved data-sharing capabilities with external stakeholders. IPs in the wildlife, conservation, and tourism sectors should consider adopting these tools as they enable flexible and comprehensive data collection and analysis on programming. This platform will allow USAID/Zimbabwe to access accurate and reliable data on activities tracked in a program's monitoring and evaluation phase.

Recommendation 2: Provide Technical Support for Innovation Hubs and Ecosystem Actors.

Innovation hubs and ecosystem actors such as Econet's Muzinda Hub initiative, the TechVillage Innovation Hub, and universities provide critical infrastructure and support that help build the capacity of entrepreneurs and innovators to turn their ideas into viable business models. Supporting these hubs and organizations is essential for developing the next generation of digital innovation talent, especially considering Zimbabwe's large youth population. These actors also play a crucial role in nurturing talent from under-represented populations, such as women entrepreneurs and those from disadvantaged communities. USAID/Zimbabwe or its IPs could provide the physical resources and shared services that enable the innovation hubs to deliver, improve, and innovate services for the agriculture sector. This support could also include the development of a digital agriculture strategy, training (such as promoting and disseminating competencies related to the agriculture sector), and participating in research and development projects to foster innovation transition.

Recommendation 3: Promote a More Collaborative Digital Ecosystem With Increased Sharing of Data and Resources.

The opening up of APIs is a crucial step to promote new innovations over the existing digital infrastructure and platforms. Critical databases, such as those developed by the MoLAFWRD, WeEffect, Econet, and NetOne, can be opened for integration to support other innovations that enhance sector-wide efficiencies. Zimbabwe can learn from the experiences of Kenya and Uganda, where dominant mobile money providers have opened up their APIs to local third-party developers to stimulate greater innovation in products.

Annexes

Annex 1: Database of Stakeholders

#	Date of Interview	Organization/Company
1	March 17, 2023	Africa University
2	February 16, 2023	Agricon Equipment
3	March 9, 2023	Agricultural Marketing Authority
4	March 1, 2023	Alley Capital Group
5	March 1, 2023	CNFA - AMALIMA LOKO Project
6	February 13, 2023	APT - Biztrack
7	February 17, 2023	Bain New Holland
8	February 14, 2023	Capital Foods
9	March 10, 2023	CC Sales
10	March 24, 2023	Commercial Bank Zimbabwe Agribusiness
11	March 9, 2023	Crop Breeding Research Institute and Mukushi Seed
12	March 6, 2023	DripTech
13	February 20, 2023	E-Livestock Global LLC
14	March 27, 2023	Ecocash Holdings
15	February 27, 2023	Econet
16	February 13, 2023	Elixir Technologies
17	February 23, 2023	eMukambo/KTA
18	February 27, 2023	Chemonics International - FARM Project
19	February 13, 2023	Farmers Friend/Polylife/IQL
20	February 16, 2023	FarmHut Africa
21	February 20, 2023	Farmshop/National Tested Seeds
22	February 22, 2023	FigJam
23	February 22, 2023	Foundations for Farming
24	March 10, 2023	Fresh in a box
25	February 22, 2023	Horticultural Development Council

26	February 14, 2023	IFAD
27	February 13, 2023	Inspire Project
28	February 13, 2023	Market Linkages Association of Zimbabwe
29	February 15, 2023	Mercy Corps
30	February 22, 2023	Ministry of Agriculture - Department of Livestock and Veterinary Services
31	March 28, 2023	Ministry of ICT, Postal and Courier Services
32	February 22, 2023	Ministry of Lands, Agriculture, Water and Rural Resettlement
33	February 15, 2023	Murimi 247
34	March 28, 2023	NetOne
35	February 22, 2023	Novatek Huku 263
36	February 27, 2023	OLD Mutual
37	March 10, 2023	POTRAZ
38	February 24, 2023	SeedCo
39	February 22, 2023	SNV Netherlands Development Organisation
40	March 9, 2023	Solidaridad
41	February 17, 2023	Stanbic Bank Zimbabwe
42	March 3, 2023	Syngenta
43	March 1, 2023	CARE International - Takunda Project
44	February 14, 2023	TechnoServe and Nespresso
45	February 15, 2023	TelOne Private Ltd
46	February 24, 2023	Umojalands Systems
47	February 16, 2023	UNDP - Accelerator Lab
48	February 13, 2023	United States African Development Foundation
49	February 14, 2023	Vaya Digital Farmer - EcoFarmer
50	February 22, 2023	We Effect
51	February 13, 2023	WHH - Agrishare / WHH - Kurima Mari
52	February 27, 2023	WILD AFRICA
53	February 28, 2023	Wildlife Conservation Action
54	February 28, 2023	Windmill

55	March 2, 2023	ZAGP- IPVC
56	February 14, 2023	Zimbabwe Farmers Union
57	February 22, 2023	Zimbabwe Mercantile Exchange
58	February 20, 2023	ECODIT - Zimbabwe Resilience ANCHORS Activity
59	February 14, 2023	Zimbabwe Super Seeds
60	February 14, 2023	ZimTrade
61	February 16, 2023	ZRBF

Annex 2: Digital Use Cases Definitions

Use Case	Definition
Advisory	Digitally-delivered information on topics such as agronomic best practices, pests and diseases, weather and market prices. This can also include more sophisticated digital services and farm management software tailored to the specific farmer, farm or field that enable SHFs to make decisions that maximize output from their land, improve the quality of agricultural production and maximize farm revenues.
Sub-use case: Farmer Information Services	Services that provide general advisory information on agronomic best practices (e.g. growing, harvesting, post-harvest treatment, storage, inputs and market prices) without tailoring the recommendations beyond national, value chain or district levels.
Sub-use case: Precision Agriculture Advisory	Recommendations tailored to individual and localized agro-climatic conditions (e.g. weather, soil, etc.), crop varieties and the economic setting of the farm (e.g. input prices, market prices and market distances).
Sub-use case: Farm Management	Solutions that feature interactive tools/applications for farmers or agents interfacing with the farmers that go beyond the delivery of tailored recommendations to specific farms. They empower farmers to make their own decisions with tools like (i) farm budgeting and planning (e.g. pro forma upside implications and risks of specific farm investments based on market conditions and/or historical farm performance); (ii) farm monitoring (e.g. dynamic yield and economic projections); and (iii) financial management, accounting, and record-keeping.
Sub-use case: Participatory Advisory	Feature tight feedback loops between content providers and end-users, greater levels of farmer interactivity with the solution (i.e. not just one-way information flows from experts to farmers), and possibly a role – direct or indirect – for farmers in creating or customizing advisory content. It includes peer-to-peer advisory solutions, which put individual farmers and farmer experts into more central roles for content creation and dissemination.

Use Case	Definition
Market Linkage & E-Commerce	Digitally-enabled solutions that link SHFs to high-quality farm inputs (e.g. seeds, fertilizers, herbicides/pesticides), to production and post-harvest machinery and mechanization services (e.g. irrigation, tractors, cold storage), or to off-take markets, including agro-dealers, wholesalers, retailers or even the end-consumer.
Sub-use case: Digitally-Enabled Value Chain Integrators	Solutions that use digital tools combined with either in-house or third-party human agents to link agricultural markets. At the core of these models is the ambition to capture value and generate impact for both smallholder farmers and agribusinesses by formalizing currently fragmented and informal value chains.
Sub-use case: Mechanization Access Services	Digital solutions that extend farmer access to agricultural machinery or mechanized farm services (e.g. irrigation, tractors, cold storage).
Sub-use case: E-Commerce Services	Online retailers of agricultural produce for urban consumers or agricultural inputs for SHFs. They rely on online order fulfillment via either shipping or a combination of online and offline (i.e. brick and mortar store) footprints.
Sub-use case: E-Marketplaces	Digitalization for Agriculture (D4Ag) market linkage solutions that require little or no human intermediation. These solutions bring individual buyers and sellers together via virtual trading marketplaces.

Use Case	Definition
Supply Chain Management	Business-to-business services that help agribusinesses, cooperatives, nucleus farms, input agro-dealers and other SHF value chain intermediaries manage the flow of goods and services.
Sub-use case: Traceability and Certification Solutions	Solutions that help agribusinesses onboard farmers, document farm compliance with standards, and trace produce across value chains with higher fidelity and lower costs.
Sub-use case: Logistics	Tools that support the surveillance and operational improvement of physical storage and transport infrastructure and, in particular, the transport of agricultural products across the full span of the value chain, from producers to markets.
Sub-use case: Supply Chain Enterprise Resource Planning (ERP) Solutions	Software that digitizes and helps manage and integrate core business processes like supply chain operations, logistics, reporting, financial tracking and human resource activities.
Sub-use case: Input Quality Assurance & Anti-Counterfeiting	Input quality assurance and anti-counterfeiting D4Ag solutions help agribusinesses ensure the integrity of their brands and help farmers validate the authenticity and quality of received inputs.

Use Case	Definition
Finance	DFS relevant for SHFs, such as digital payments, savings, smallholder credit and agricultural insurance, which increase financial access and equip SHFs to improve yields and incomes and invest in the longer-term growth of their farms.
Sub-use case: Payments	Allows SHFs, input providers, buyers and others to exchange money with each other without cash.
Sub-use case: Insurance	A valuable tool to help SHFs avoid devastating financial losses and limit downside risks associated with investing in their own productive capacity.
Sub-use case: Credits and Loans	Digital lending products specifically designed for farmers and digitized elements of lenders' operations.
Sub-use case: Savings	Ensure expenditure smoothing across variable seasonal income patterns, to make farm investments, and to build household resilience in the face of agriculture-related shocks (e.g. pest/disease infestations) or personal financial crises (e.g. unanticipated health expenditures).
Sub-use case: Credit Scoring	Services that provide digitally-enabled automated credit scoring.
Sub-use case: Financial Analytics	Collecting and analyzing data on the financial habits of farmers and triangulating such information with alternative data sources including satellite data, weather data, and soil quality data.
Sub-use case: Crowdfunding	Digital platforms to link farmers who need capital with sponsors who wish to invest; a form of 'crowd-sourced' financing in the agriculture context.
Sub-use case: FSP digitalization	Digitalization of enterprises engaged in the delivery of financial services and products including commercial banks, insurers, payments companies, microfinance institutions (MFIs) and savings and credit cooperative organizations (SACCOs).

Use Case	Definition
Ecosystem Support	Data analytics solutions and digital decision support tools that integrate a variety of data sources on SHFs, farms and markets and convert this information into useful country- and value-chain-level insights and decision tools for government policymakers, extension agencies, agronomists, agribusinesses and investors.

Annex 3: Deep Dives of Innovations Operational in Zimbabwe

Name of Organization:	Knowledge Transfer Africa (KTA)	Name of Service:	eMKambo
Provider Type:	Technology provider		
Relevant Taxonomy:	Advisory, market linkage and e-commerce	Relevant Taxonomy Sub-Categories:	Farmer information services, digitally enabled value chain integration, e-marketing
# of Clients:	Reached one million users, where 600k are active users (defined by KTA as users with active/open phone lines that are still receiving messages and interacting in WhatsApp groups). 50 percent of users are women.	Value Chain Focus:	All value chains, with over 80 commodity prices
Overview of Service:	eMKambo is KTA's flagship product in Zimbabwe. It is an interactive mobile, physical, and web-based market for agriculture and rural development. eMKambo collects and updates prices of agriculture commodities on their webpage, and sends this information via emails and WhatsApp. The platform also offers radio and bulk SMS solutions for farmers with varying digital literacy levels. The goal of the platform is to enable farmers to use the pricing data and trends to inform decision-making.		

Name of Organization:	Alley Capital Group	Provider Type:	Technology provider
Relevant Taxonomy:	Advisory	Relevant Taxonomy Sub-Categories:	Precision agriculture, farm management
# of Clients:	30 commercial farmers have used the service.	Value Chain Focus:	Agnostic
Overview of Service:	Alley Capital Group specializes in agricultural smart technologies in the field of GPS-automated drone crop spraying for commercial farmers. When using the services, the team first generates a map of the field, and the drone will automatically generate a flight path in the field based on the spray volume per unit area or the set elevation above the crop area. The drones fly on batteries and the company uses generators and power supply on the farm. Approximately 30 commercial farmers have used the service as of February 2023. The key benefits of using drone spraying compared to other methods include high cost and time efficiency, increased effectiveness and convenience, and rapid response due to the high portability of the system.		

Name of Organization:	FarmHut	Provider Type:	Technology provider
Relevant Taxonomy:	Advisory, market linkage and e-commerce, supply chain management	Relevant Taxonomy Sub-Categories:	Farmer information services, e-commerce services, logistics
# of Clients:	400K farmers, 120 restaurants, and 150 fresh farm retailers	Value Chain Focus:	Horticulture (fresh veggies and fruits), tobacco, and livestock (chicken, pork,

			and beef)
Overview of Service:	FarmHut is a business-to-business agtech platform that focuses on shortening and bringing efficiency to the agro-supply chain by connecting farmers to restaurants, retailers, and vendors. FarmHut provides an opportunity for restaurants and institutions to get fresh and good quality produce straight from the farm. It also facilitates the transportation of produce from the farmers to restaurants. The company has partnered with Econet, AGRITEX, and ZFU to facilitate the provision of agronomic tips to the farmers through USSD, web-based, and WhatsApp platforms. Customers include SHFs, large farmers, farmers' unions, restaurants, and banks.		

Name of Organization:	TelOne	Name of Service:	TelOne Crop Monitoring
Provider Type:	Technology provider		
Relevant Taxonomy:	Advisory, market linkage and e-commerce, ecosystem support	Relevant Taxonomy Sub-Categories:	Precision agriculture advisory, farm management, digitally enabled value chain integration
# of Clients:	TBD - the system is currently being upgraded and will soon be deployed.	Value Chain Focus:	Agnostic
Overview of Service:	TelOne has a data-gathering software solution aimed at ensuring that players in the agriculture value chain sector make critical decisions based on high-quality earth observation data. At a minimum subscription fee of US$2 per hectare per year, this platform can analyze farm conditions, and produce data on variables like field monitoring, weather data, crop classification, and yield prediction to be used in decision-making. It also offers other unique benefits like Farm Zoning Technology for use with precision farming equipment (i.e. smart tractor), the Scouting mobile App, farm management features, and access to daily high-resolution images as an optional add-on. The product has multiple users including farmers, insurance companies, financing institutions, input suppliers, and government crop assessment teams.		

Name of Organization:	E-Livestock Global LLC	Provider Type:	Technology provider
Relevant Taxonomy:	Advisory, supply chain management, finance	Relevant Taxonomy Sub-Categories:	Farm management, traceability and certification, credit scoring
# of Clients:	Eight commercial farmers are currently on-boarded to the platform with 10,000+ animals. The system will be revamped over the next six months.	Value Chain Focus:	Livestock (including cattle)
Overview of Service:	E-Livestock Global LLC has a livestock traceability solution, tracking the health status of animals, and proof of ownership, and can potentially be linked to the blockchain allowing collateralization of cattle. The system allows a farmer to manage their herd remotely and have access to information about the animals including date of birth, vaccination sessions performed, and animal movement. The solution is currently in a pilot phase and approximately 10,000 animals in the commercial farming sector have been tagged in Zimbabwe.		

Name of Organization:	NetOne	Name of Service:	OneMoney, Hurudza-Umlimi Omkhulu, OneSure, Katsaona
Provider Type:	Technology provider		
Relevant Taxonomy:	Advisory, market linkage and e-commerce, finance, ecosystem support	Relevant Taxonomy Sub-Categories:	Farmer information services, e-commerce services, payments, credit and loans
# of Clients:	NetOne has 3,691,314 active subscribers on the OneMoney Mobile Wallet platform and over 250k users of the OneSure mobile app.	Value Chain Focus:	Crops and Livestock value chains. covering cereals, legumes, tobacco, cotton, horticulture (fruits and vegetables), beef, dairy, pork, goats, chickens, fish, and bees
Overview of Service:	NetOne is a mobile network operator in Zimbabwe. Services include the OneMoney Mobile Wallet platform, a mobile payments solution service provided to NetOne subscribers. It enables peer-to-peer, business-to-business, consumer-to-business, and business-to-consumer payments. NetOne also offers Hurudza-Umlimi Omkhulu, a platform that provides agricultural information on crops and livestock, market prices for products, and weather tips for subscribing farmers. The OneSure mobile application enables users to buy their vehicle insurance, and the Bulk SMS service offers agribusinesses direct marketing services to their farmers. NetOne's 'Katsaona' enables OneMoney customers to access collateral-free loans.		

Name of Organization:	Cassava Technologies	Name of Service:	Vaya Digital Farmer / EcoFarmer
Provider Type:	Technology provider		
Relevant Taxonomy:	Advisory, market linkage and e-commerce, finance	Relevant Taxonomy Sub-Categories:	Farmer information services, farm management, digitally enabled value chain integration, mechanization access services, e-commerce services, e-marketing, credit scoring, insurance
# of Clients:	EcoFarmer advisory tips: 6,000 users EcoFarmer advisory market services: 1.4 million users Vaya tractor: 1.4 million users	Value Chain Focus:	Cereals, legumes, tobacco, cotton, fruits, beef, dairy, pork, goats, chickens, fish, bees
Overview of Service:	Vaya Digital Farmer is a platform offering digital services that connect small-scale and large-scale farmers to information, inputs, equipment, insurance, credit, and buyers. With Dial-a-Muthumani/Advisory Help Desk, customers with an Econet line can call 144 to talk to a farming specialist for free. This service is currently being reworked and will relaunch. With EcoFarmer's Bulk SMS, agribusinesses can advise farmers on best production practices. EcoFarmer Advisory Tips is a subscription-based service offering tips to farmers on maize, groundnuts, tobacco, cattle, goats, bees, and sorghum. The Vaya Tractor platform allows		

	farmers to hire, book and pay for farming equipment on their mobile phones by dialing *902#. The Diaspora Agriculture Finance Plan allows Zimbabweans that are based in the diaspora to buy agricultural inputs and pay for tillage services for their family back home. Lastly, the Zimbabwe Farmers Union - EcoFarmer Combo is a bundle of services, including EcoFarmer Maize or Cattle Tips and Weather Indexed Insurance, ZFU Membership, and EcoSure Funeral Cover.

Name of Organization:	FIGJAM	Name of Service:	Sales Force Automation (SFA) and Van Sales
Provider Type:	Technology provider		
Relevant Taxonomy:	Advisory, supply chain management, finance	Relevant Taxonomy Sub-Categories:	Participatory advisory, supply chain ERP solutions, financial analytics
# of Clients:	1,500+ active users	Value Chain Focus:	Veterinary product distribution solutions, seed, agrochemicals, fertilizer distribution
Overview of Service:	FIGJAM markets two products, SFA and Van Sales. SFA is a set of field management tools used by field staff visiting sites and by managers/supervisors from a back office. The toolset is used for effective tracking and coverage of site visits and empowering field teams to collect valuable field/market data through various survey/form features. The management portal is used to manage their teams and receive reporting insights. Van Sales is a purpose-built cash van selling system that delivers capabilities around loading/transferring stock to mobile warehouses, customer routes, sales and invoicing, mobile Bluetooth printing, stock unload reconciliations and cash-up reconciliations. Both products have been developed to help companies work smarter. The digital products are suited for the following industries: agribusinesses, pharmaceutical distribution, fast-moving consumer goods distribution, and data/market intelligence gathering.		

Name of Organization:	EcoCash Holdings	Provider Type:	Financial institution
Relevant Taxonomy:	Finance	Relevant Taxonomy Sub-Categories:	Savings, payments, credit and loans, credit scoring, insurance
# of Clients:	five million	Value Chain Focus:	Agnostic
Overview of Service:	EcoCash Holdings started as a business unit under the Econet Wireless Group as an innovative mobile payment solution and has since grown its business portfolio to encompass assets in FinTech, InsurTech, On-Demand Services, e-Commerce, Agritech, Healthtech, and Edutech. EcoCash's mobile money solution allows Econet customers to perform money transfers, bill pay, online payments, bulk payments, payment for goods and services, and CICO, among others. Customers can also access loans through Kashagi, a micro-loan facility from EcoCash and Steward Bank that allows subscribers to request a loan via their mobile phone. Repayment is after 30 days with an admin fee of 25 percent and 0 percent interest.		

Name of Organization:	Welthungerhilfe (WHH)	Name of Service:	Kurima Mari

Provider Type:	Development organization		
Relevant Taxonomy:	Advisory, market linkage and e-commerce	Relevant Taxonomy Sub-Categories:	Farmer information services, participatory advisory, farm management, digitally enabled value chain integration, mechanization access services
# of Clients:	Kurima Mari has a subscription of 140,457 subscribers (both offline and online subscribers).	Value Chain Focus:	Beef, poultry, legumes, cereals, etc.
Overview of Service:	WHH is a German INGO that developed the Kurima Mari Android advisory application, which has production information for various crops and livestock. The application has offline capabilities and a WhatsApp chatbot for farmers. The organization has also developed Kurima Mari beef and poultry-specific applications. The Kurima Mari application has been used in a number of WHH projects in Zimbabwe, Malawi, and Uganda. WHH also does digital literacy trainings to raise awareness of the apps among farmers, which has helped encourage uptake. WHH also developed the tractor and transport-hiring application, Agrishare, but this application struggled to take off in Zimbabwe.		

Name of Organization:	WeEffect	Provider Type:	Development organization
Relevant Taxonomy:	Advisory, market linkage and e-commerce, supply chain management	Relevant Taxonomy Sub-Categories:	Farmer information services, participatory advisory, digitally enabled value chain integration, e-marketing, traceability and certification, logistics, quality assurance and counterfeiting
# of Clients:	Seven dairy processors, 41 extension workers in ZADF, and 39 ministry officials	Value Chain Focus:	Dairy
Overview of Service:	WeEffect is implementing Transforming Zimbabwe's Dairy Value Chain for the Future (TranZDVC) project which is aimed at addressing the root causes of underperformance of the dairy value chain in Zimbabwe by strengthening the linkages between production, processing. and financing. WeEffect is partnering with the GoZ, Zimbabwe Association of Dairy Farmers (ZADF), ZFU, and Zimbabwe Dairy Industry Trust (ZDIT). WeEffect developed the Mukaka Bulk SMS Platform to send out market prices alerts, company or processor adverts broadcasting, and important announcements in the dairy sector. They also have a dairy WhatsApp group for sharing relevant sector-wide information. WeEffect also developed an online dairy database that is hosted by the government and helps link farmers to milk collection centers, processors, and transporters.		

Name of Organization:	Ministry of Lands, Agriculture, Fisheries, Water, Climate and Rural Development (MoLAFWRD)	Name of Service:	AgriTips 365
Provider Type:	Government agency		

Relevant Taxonomy:	Advisory, ecosystem support	Relevant Taxonomy Sub-Categories:	Farmer information services, farm management
# of Clients:	N/A	Value Chain Focus:	Multiple value chains
Overview of Service:	The Department of Agricultural Technical and Extension Services (AGRITEX) uses an SMS platform that can deliver pre-planting, growing, harvesting, post-harvest, and marketing information. Additionally, the department staffs the Dial-a-Muthumani/Advisory Help Desk where farmers with an Econet line can call 144 for free to inquire about horticulture, tobacco, and livestock. The government has also established 1,000 digital villages where farmers and resident extension workers can have access to fast and stable connectivity through VSAT technology. The Ministry launched AgriTips 365, a platform that allows the flow of valuable agric-related information to empower farmers on aspects of technical production, marketing, and agri-premiership covering crops, livestock, fisheries, and animal health issues. The content is developed and standardized by the Department of Research and Specialist Services and distributed through the website and ward-level WhatsApp and Facebook groups.		

Name of Organization:	Agricultural Marketing Authority (AMA)	Provider Type:	Government agency
Relevant Taxonomy:	Advisory	Relevant Taxonomy Sub-Categories:	Farmer information services
# of Clients:	Two million farmers are estimated to be registered.	Value Chain Focus:	Multiple value chains
Overview of Service:	AMA's mandate is to regulate the production and marketing of all agricultural products in Zimbabwe, as well as to register all farmers and merchants. AMA has a web-based platform used by value chain actors to upload produce and livestock for marketing purposes. The organization also shares pricing information and marketing bulletins through email, social media, and WhatsApp.		

Name of Organization:	DripTech	Provider Type:	Agribusiness
Relevant Taxonomy:	Advisory, market linkage and e-commerce	Relevant Taxonomy Sub-Categories:	Precision agriculture advisory, farm management, mechanization access services
# of Clients:	N/A	Value Chain Focus:	High-value crops including blueberries, horticulture, floriculture
Overview of Service:	DripTech is a company that specializes in the supply of irrigation-related equipment including pumps, piping, tanks, and center pivots. One tool includes DAB D.Connect, which allows a user to detect errors on their pump when they log in to their system, for example, if the tank is running dry. Netajet irrigation controller allows a farmer to connect various pumps that feed into one line which will feed into different fields. The farmer can now schedule when each field should be watered. These technologies are mainly targeted at commercial farmers who are doing high-value crops like blueberries, horticulture, and floriculture.		

Name of Organization:	CC Sales	Provider Type:	Agribusiness
Relevant Taxonomy:	Advisory, market linkage and e-commerce	Relevant Taxonomy Sub-Categories:	Farmer information services, e-commerce services, e-marketing
# of Clients:	To date, CC Sales has had two live auctions at two farms. The average number of buyers at each auction has been 20.	Value Chain Focus:	Livestock (cattle)
Overview of Service:	CC Sales provides marketing solutions through a number of channels, including livestock auctions to link farmers to markets. The company conducts live livestock auctions and online auctions (via the web and mobile app) where buyers can purchase livestock. CC Sales also disseminates information on auctions and prices through WhatsApp and email blasts. The company adopted live auctions due to COVID-19 when there were restrictions on physically going to livestock auctions.		

Name of Organization:	Novatek	Name of Service:	Huku 263
Provider Type:	Agribusiness		
Relevant Taxonomy:	Advisory, market linkage and e-commerce	Relevant Taxonomy Sub-Categories:	Farmer information services, participatory advisory, farm management, e-marketing
# of Clients:	Averages 10 unique interactions per day	Value Chain Focus:	Poultry
Overview of Service:	Huku 263 is a WhatsApp chatbot used for farmers to inquire basic production information and prices of inputs. The application was rolled out during COVID-19 when Novatek could not interact with farmers physically and hence wanted to create a self-service application that could help the farmers remotely access production and pricing information. The service helps farmers access information at a low cost and saves the company time and resources that they previously spent conducting physical meetings. One challenge noted is that some farmers prefer physical meetings and do not trust information received from a chatbot.		

Name of Organization:	Syngenta	Name of Service:	My Seeds Syngenta
Provider Type:	Agribusiness		
Relevant Taxonomy:	Advisory, market linkage and e-commerce	Relevant Taxonomy Sub-Categories:	Farmer information services, participatory advisory, farm management, digitally enabled value chain integration
# of Clients:	The application has 2,305 active users in Zimbabwe. The company has trained over 7,000 farmers on WhatsApp.	Value Chain Focus:	Horticulture

Overview of Service:	Syngenta is an agricultural company specializing in supplying farmer inputs including vegetable seeds and crop chemicals. The company developed a smartphone application, My Seeds Syngenta, which provides farmers with agronomic data, pest and disease identification information, products that Syngenta has in the country, videos of field days and farmers' trainings, a distributors list, and a 7-day weather forecast. The company has WhatsApp groups per province for training and information dissemination and has conducted trainings over Zoom.

Annex 4: Digital Use Cases Present in Zimbabwe

View table in Google Sheets.

Stakeholder Classification	Organization Name	Advisory				Market Linkage and E-commerce				Supply Chain Management				Finance								Ecosystem Support
		Precision Ag. Advisory	Farmer Info. Services	Participatory Advisory	Farm Mgmt.	Digitally Enabled Value Chain Integration	Mechanization Access Services	E-commerce Services	E-marketing	Traceability and certification	Logistics	Supply chain ERP solutions	Quality assurance and counterfeiting	Savings	Payments	Credit and Loans	Credit scoring	Insurance	Financial Analytics	Crowdfunding	FSP digitization	Ecosystem Support
Technology Providers	Alley Capital Group	x			x																	
	FarmHut Africa		x					x			x											
	eMukambo / KTA		x			x			x													
	E-Livestock Global LLC				x					x							x					
	Elixir Technologies																					x
	Murimi 247		x		x	x	x				x								x			
	Farmers Friend/Polylife/ IQL									x	x											
	Zimbabwe Mercantile Exchange		x					x	x													
	EcoNet																					x
	NetOne		x					x							x	x		x				x
	Vaya Digital Farmer - Ecofarmer		x		x	x	x	x	x								x	x				

	Tel One Private Ltd	x			x	x																x
	FigJam			x								x							x			
	Umojalands Systems																x					x
Financial Institutions	Stanbic Bank Zimbabwe														x	x		x			x	x
	Ecocash Holdings													x	x	x	x	x				
	Commercial Bank Zimbabwe Agribusiness													x	x	x	x	x				x
	OLD Mutual																	x				
USAID IPs	AMALIMA LOKO Project - CNFA		x																			x
	Takunda Project - CARE International		x																			x
	Foundations for Farming		x		x																	x
	ANCHORS Activity - ECODIT	x	x																			x
	FARM Project - Chemonics International		x																			
Other Donor Funded Ag Projects	IFAD		x																			
	ZRBF (UNDP)		x	x	x	x			x													x
	ZAGP		x	x	x				x													
	United States African			x							x	x			x							

	Development Foundation (USADF) Enterprise Dev Program																					
	Technoserve & Nespresso		x		x	x				x								x				x
	Mercy Corps (Agrifin)	x	x															x				
	WILD AFRICA	x																				x
	Wildlife Conservation Action																					x
	SNV Netherlands Development Organisation		x	x		x								x				x				
	We Effect		x	x		x			x	x	x		x									x
	WHH		x	x	x	x	x		x													
	UNDP Accelerator Lab																					x
	APT - Ag Partnership Trust				x														x			
Government Agencies	Ministry of Agriculture - Department of Livestock and Veterinary Services					x																x
	Agricultural Marketing Authority		x																			
	POTRAZ																			x		x

	Zimtrade		x					x														x
	Ministry of Lands, Agriculture, Fisheries, Water, Climate and Rural Development		x		x																	x
	Ministry of ICT, Postal and Courier Services																					x
Research Institutions	Crop Breeding Research Institute and Mukushi Seed	x																				x
	Africa University		x																			x
Agribusinesses / Cooperatives	Market Linkages Association of Zimbabwe																					x
	Agricon	x							x													x
	Bain New Holland	x							x													
	Zimbabwe Super Seeds		x		x							x			x							
	Fresh in a box							x			x											
	Novatek		x	x	x				x													
	SeedCo		x	x	x	x			x													
	Syngenta		x	x	x	x																
	Capital Foods		x		x																	
	Windmill		x	x					x													

	Farmshop		x	x																		
	Driptech	x			x		x															
	CC Sales		x					x	x													
	Horticulture Development Council																					x
	Zimbabwe Farmers Union		x	x																		x

Annex 5: KII Question Sets

These are the standard lists of questions asked during interviews. Given limitations around time and varying applicability, the question set was not always followed exactly as it is outlined below.

TECHNOLOGY PROVIDERS QUESTION SET

Background Info

1. Name of the organization
2. Name of the interviewee
3. Date of the interview

Introduction to Product

4. Please tell us about your product and the rationale for developing it?
    a. What are the key challenges this product is trying to overcome?
    b. Who are the target users, and how did you design for them? (B2B vs. B2C)
        i. Is the product geared towards a specific gender or age range? (men, women, youth, etc). If so, how did you design for them?
    c. Is it geared toward specific value chains and, if so, which?
5. For which use cases are your products?
    a. Advisory: digitally delivered information on topics such as agronomic/livestock best practices, pests and diseases, weather, and market information including, including prices, as well as more sophisticated digital services and tailored farm management software
    b. Market linkages and E-commerce: value chain integrators, farm service providers, mechanization access services, e-commerce services, e-marketplaces
    c. Supply chain management: logistics, procurement, input quality assurance & anti-counterfeiting, traceability and certification solutions, supply chain ERP solutions
    d. Finance: payments, savings, insurance, credit and loans, credit scoring, etc.
    e. Ecosystem Support: data analytics solutions and digital decision support tools for useful country- and value-chain-level insights
    f. Other (please specify)
6. How was the design of your product shaped by:
    a. Connectivity available to your target audience?
    b. Device ownership and digital literacy of your target audience?
    c. Other digital services used by your target audience (social media, mobile money, etc.)?
    d. User concerns about privacy, cost, or other factors?
7. What hardware does the product require? (Tablets, Smartphones, basic phones, laptop/desktops)
8. Who funded / invested in tool development? What is their current role?

Product Details

9. How interactive is the product/tool?
10. Does this product integrate with other platforms? (e.g., Whatsapp, USSD codes, etc.) Please describe.
11. Please describe the network requirements for the product to function (e.g., online, offline, 2G)
12. Please tell us about user security on the product.
    a. What are the login features?
    b. Does your product hold an ISOs concerning security? If so please specify?
    c. Does your product offer dual authentication? (e.g., password, facial recognition, finger print,etc.)
13. Please discuss how data is managed

    a. What data is collected?
    b. What security features do you hold around the data (Advanced firewalls, intrusion detection, event logging, internal firewalls, encryption....)
    c. Who owns the data?
    a. Do you share access to the data with any third-parties? If so, on what terms/conditions?
    d. If a product collects personally identifiable information data on customers, what rights do those customers have to their data? (i.e. data mobility, informed consent on use of data)
14. What customer support features exist? (e.g., call center, in-person field staff) How are they used?
15. Do you allow remote feedback from users? If yes, what are the mechanisms?
16. Have you made any tool modifications / changes due to COVID-19?

User Uptake

17. How is the tool rolled out to users?
    a. How are users onboarded? (i.e. self onboarded, field agent onboarding)
    b. Is training needed, and if so, estimated training time / # of sessions?
    c. Do you supply hardware to any users?
18. Have users expressed if there are any features of the tool that made its adoption easier/faster?
19. What challenges have you experienced with the roll-out of the tool?
    a. Training needs for customers?
20. How many users does it have?
    a. Active users?
    b. By type (i.e. farmer, agribusiness)? By gender?
    c. By region? (If they don't know #s by division, get at least the divisions with active users)
21. What successes / results has the tool realized? (i.e. in uptake, on agricultural productivity and income)

Costs and Revenue-Making

22. What are your revenue streams? Who pays to use the service? What is your pricing model?
23. How do you calculate the revenue the tool brings to your business?
24. What was the tool's total revenue in 2021 and/or 2022?
    a. If they do not wish to say - can they tell if they had net positive revenues, or tell us about how that figure is changing?
25. What is your average revenue per user per year?
    a. If they do not wish to say - can they tell if they had net positive revenues/user, or tell us about how that figure is changing?
    b. Does this number change as you grow?
    c. Does it grow large or smaller as your customer base grows, or does it stay the same?
26. What are your customer acquisition strategies? What channels do you advertise through?
27. What is your customer acquisition cost?
    a. If they do not wish to say - what types of costs go into customer acquisition?

Growth

28. What are your plans to reach more users?
    a. Are there specific customer segments your organization is focusing on? Which ones and why?
29. Do you have plans to expand within your value chains or sell the tool to other agribusinesses?
30. Are there any new features or integrations you have planned? If so, what are they and what is the timeline for their deployment?
31. How have you developed financial projections for the tool? How do you use them on an ongoing basis?
    a. Trying to get to: Do you have an active business plan
32. Please describe what you see as the Total Addressable Market for this tool. What is your target customer mix?
33. How do you segment this TAM for planning purposes?
34. What, if any, competitor digital tools are you aware of? How is your product differentiated?

Regulatory Environment

35. Are there specific regulations that present challenges to your service?

Enabling Environment

36. How easy is it to hire ICT workers?
37. Is your organization part of any ICT associations? If so, which ones?
38. Are you aware of any accelerators / incubators?
39. Which other service providers are you aware of that are innovating for digital technologies in the agricultural sector?

Last Thoughts

40. Is there anything else you think we should know? Advice to USAID?
41. Who else would you suggest we speak with? Can you provide contact information?
42. Could you give us phone #s for any users?

AGRIBUSINESSES AND COOPERATIVES QUESTION SET

Background Info

1. Name of the organization
2. Name of the interviewee
3. Date of the interview
4. Please give us a quick overview of your organization's work, highlighting in particular your work with farmers, women, youth and value chain actors.
5. Does your organization work with young people and women?
    a. What incentives could lead young people to be more involved with agriculture?
    b. How important is technology and ICT to young people and women in agriculture?
6. How does mobile phone ownership/usage differ between men and women in the communities you work with? What is mobile phone usage gender breakdown among your farmers?
7. In your opinion, what are the key barriers to agriculture productivity in Zimbabwe?
    a. Do you think any of these could be addressed by technology?
8. Has your organization used digital technology or services before?
    a. *If yes, move to the "using digital agricultural services" questionnaire below.*
    b. *If they would like you to provide a definition, share the following:* digital technologies/services refers to ICT-based or modern digital tools/mechanisms adopted to advance businesses/agricultural operations and serve partners (like farmers)
    c. *If no, then move to the "Does Not Use Digital Tools/Services" questionnaire below*

USING DIGITAL AGRICULTURE SERVICES

Description of Digital Services

9. Please tell us about the different digital tools and services your organization uses or used? Is it computer-based? Smartphone? Basic phone?
    a. *Make sure to try to ask them about any agriculture-specific digital tools*
10. Which digital agriculture products are more prevalent for your organization? *Mention examples before if clarity is required.*
    a. Advisory: digitally delivered information on topics such as agronomic/livestock best practices, pests and diseases, weather, and market information including prices, as well as more sophisticated digital services and tailored farm management software

b. Market linkages and E-commerce: value chain integrators, farm service providers, mechanization access services, e-commerce services, e-marketplaces
c. Supply chain management: logistics, procurement, input quality assurance & anti-counterfeiting, traceability and certification solutions, supply chain ERP solutions
d. Finance: payments, savings, insurance, credit and loans, credit scoring, etc.
e. Ecosystem Support: data analytics solutions and digital decision support tools for useful country- and value-chain-level insights
f. Other (please specify)

11. Agribusinesses: What types of digital and ICT tools do your farmers use? (examples: Satellite, weather and information services, solar powered equipment, digital financial services, market linkages and e-commerce platforms, digital analytics tools, etc.) Do you offer any of those services to them?
    a. How are these digital tools priced for farmers? Built into overall service delivery, free, contract farming, delivered at market price?
    b. Do your farmers receive training for the above mentioned services? Who provides these training sessions? How often are they trained in a year?
12. How did you hear/learn about the digital services you are using?
13. What factors led your organization to adopt digital services?
14. Did you ever discontinue using a digital tool or service? If so, what was it and why did you stop using it?

UX/Hardware

15. What hardware requirements does the digital tool have?
16. Do you find it easy to use? If yes, why, if no, why?

Roll Out and Uptake

17. Can you tell us how you came to start using the digital solution(s)? What problems were you trying to solve?
18. What was the biggest incentive for transitioning to the use of digital agriculture tools in your work?
19. What were the major risks considered, financial or otherwise, in transitioning to the use of digital agriculture tools in your work?
20. What was the uptake like within your company/organization? How did you train staff? How did you deal with behavior change issues, if applicable?
21. Who pays for the service/solution?
    a. *Potential follow up:* what is your transition strategy for when your donor funding ends?

Challenges

22. Beside any challenges you cited before in uptake, have there been other challenges in the roll out of these digital services?
    a. Staff/member uptake?
    b. Data Entry?
    c. Connectivity?
    d. Cost?
    e. Availability of hardware/options for affordable repair?
    f. Access to electricity?
    g. Security?
    h. Theft?
23. How have you mitigated or addressed these challenges?
24. How has COVID-19 affected the roll out or use of these digital services to your farmers?

Benefits

25. What would you say have been the greatest benefits your organization has received from the use of the digital tools (Ensure we are capturing their thoughts on each digital tool they use)? Consider specifically:
    a. Cost effectiveness?

b. Efficiency?

26. Have these tools helped improve your organization's decision making as a business? If yes, how so?
27. What other benefits does your organization hope to achieve from using digital tools?
28. How does your organization plan to use the digital service long term? Do you consider it as a key part of your organization's success?

Last Thoughts

29. Is there anything else you think we should know? Advice to USAID?
30. Who else would you suggest we speak with? Can you provide contact information?
31. Could you put us in touch with anyone within your organization that makes use of the digital service?

NOT USING DIGITAL TOOLS/SERVICES

Reasons for Not Adopting Digital Technology

1. Why has your organization not used digital technologies?
2. What are the primary barriers to using digital technologies?
    a. Cost?
    b. Digital literacy?
    c. Network connectivity?
    d. Preferences?
    e. Migrating systems and processes?
    f. Availability of hardware/options for affordable repair?
    g. Leadership and/or staff buy-in?
    h. Other?

Potential Use of Tech

3. Has your organization ever considered using any types of digital services in the past? If yes, what kind?
4. If you were to use digital services, who would this be catered towards? Farmers, staff, administrative, etc.?
5. What steps would need to be put in place to implement this digital technology?
6. What level of training / capacity building would be required to offer this digital product?
7. Is this a product that you could build in-house or would you have to partner with a technology company?
8. If partnering with a technology company, do you have an idea of the potential technology companies that you could partner with for this?
9. How could organizations/donors like USAID best facilitate you in adopting digital technologies?
10. Which organizations are best suited to support you in adopting digital technologies?

Last Thoughts

11. Is there anything else you think we should know? Advice to USAID?
12. Who else would you suggest we speak with? Could you allow us to speak to a couple of farmers? Can you provide contact information?

IPs / DONOR-FUNDED PROJECTS QUESTION SET

Background Info

1. Name of the organization
2. Name of the interviewee
3. Date of the interview
4. How would you describe your organization's core purpose?
5. How would you describe your target beneficiary / customer?

6. Please give us a quick overview of your organization's work in Zimbabwe, highlighting in particular your work with farmers, women, youth and value chain actors.
7. Does your organization use digital agriculture services/tools in programs/activities?
    a. *If no, then move to the "Does Not Use Digital Tools/Services" questionnaire below*
8. If yes, did you fund and develop the tool/service or was it provided by a service provider?
    a. *If provided by a service provider, move to the "using digital agricultural services" questionnaire below.*
    b. *If funded and developed by the organization, move to the "developing digital agricultural services" questionnaire below.*

USING DIGITAL AGRICULTURE SERVICES

Description of Digital Services

9. Please tell us about the different digital tools and services your organization uses or used in programs/activities? Is it computer-based? Smartphones? Basic phone?
10. For which use cases are your activities using digital technologies?
    a. Advisory: digitally delivered information on topics such as agronomic/livestock best practices, pests and diseases, weather, and market information, including prices, as well as more sophisticated digital services and tailored farm management software
    b. Market linkages and E-commerce: value chain integrators, farm service providers, mechanization access services, e-commerce services, e-marketplaces
    c. Supply chain management: logistics, procurement, input quality assurance & anti-counterfeiting, traceability and certification solutions, supply chain ERP solutions
    d. Finance: payments, savings, insurance, credit and loans, credit scoring, etc.
    e. Ecosystem Support: data analytics solutions and digital decision support tools for useful country- and value-chain-level insights
    f. Other (please specify)
11. Who uses the tools and services? Staff? Value chain actors, including Farmers?
12. How did you hear/learn about the digital services you are using?
13. What factors led your organization to adopt digital services?
14. Did you ever discontinue using a digital tool or service? If so, what was it and why did you stop using it?

UX/Hardware

15. What hardware requirements does the digital tool have?
16. Do you find it easy to use? If yes, why, if no, why?

Roll Out and Uptake

17. Can you tell us how you came to start using the digital solution(s)? What problems were you trying to solve?
18. What was the biggest incentive for transitioning to the use of digital agriculture tools in your work?
19. What were the major risks considered, financial or otherwise, in transitioning to the use of digital agriculture tools in your work?
20. What was the uptake like within your company/organization? How did you train staff? How did you deal with behavior change issues, if applicable?
21. Who pays for the service/solution?
    a. *Potential follow up:* what is your transition strategy for when your donor funding ends?
    b. If payments were made by implementing partners, when did beneficiaries begin to pay for the services?

Challenges

22. Beside any challenges you cited before in uptake, have there been other challenges in the roll out of these digital services?

a. Staff/member uptake?
b. Data Entry?
c. Connectivity?
d. Cost?
e. Availability of hardware/options for affordable repair?
f. Access to electricity?
g. Security?
h. Theft?

23. How have you mitigated or addressed these challenges?
24. Has COVID-19 affected the roll out or use of these digital services?
    a. Have you made any tool modifications / changes due to COVID-19?

Benefits

25. What would you say have been the greatest benefits your organization has received from the use of the digital tools (Ensure we are capturing their thoughts on each digital tool they use)? Consider specifically:
    a. Cost effectiveness?
    b. Efficiency?
26. Have these tools helped improve your organization's decision making as a business? If yes, how so? If not, why?
27. What other benefits does your organization hope to achieve from using digital tools?
28. How does your organization plan to use the digital service long term? Do you consider it as a key part of your organization's success?

Last Thoughts

29. Is there anything else you think we should know? Advice to USAID?
30. Who else would you suggest we speak with? Can you provide contact information?

DEVELOPING DIGITAL AGRICULTURAL SERVICES

Introduction to Product

1. Please tell us about your product and the rationale for developing it?
    a. What are the key challenges this product is trying to overcome?
    b. Who are the target users, and how did you design for them? (B2B vs. B2C)
        i. Is the product geared towards a specific gender or age range? (men, women, youth, etc). If so, how did you design for them?
    c. Is it geared toward specific value chains and, if so, which?
2. For which use cases are your products?
    a. Advisory: digitally delivered information on topics such as agronomic/livestock best practices, pests and diseases, weather, and market information, including prices, as well as more sophisticated digital services and tailored farm management software
    b. Market linkages and E-commerce: value chain integrators, farm service providers, mechanization access services, e-commerce services, e-marketplaces
    c. Supply chain management: logistics, procurement, input quality assurance & anti-counterfeiting, traceability and certification solutions, supply chain ERP solutions
    d. Finance: payments, savings, insurance, credit and loans, credit scoring, etc.
    e. Ecosystem Support: data analytics solutions and digital decision support tools for useful country- and value-chain-level insights
    f. Other (please specify)
3. How was the design of your product shaped by:
    a. Connectivity available to your target audience?
    b. Device ownership and digital literacy of your target audience?

    c. Other digital services used by your target audience (social media, mobile money, etc.)?
    d. User concerns about privacy, cost, or other factors?
4. What hardware does the product require? (Tablets, Smartphones, basic phones, laptop/desktops)
5. What institutions funded / invested in tool development? What is their current role?
    a. *If the implementing partner is paying:* what is your transition strategy for when your donor funding ends?
    b. If payments were made by implementing partners, when did beneficiaries begin to pay for the services?

Product Details

6. How interactive is the product/tool?
7. Does this product integrate with other platforms? (e.g., Whatsapp, USSD codes, etc.) Please describe.
8. Please describe the network requirements for the product to function (e.g., online, offline, 2G)
9. Please tell us about user security on the product.
    a. What are the login features?
    b. Does your product hold an ISOs concerning security? If so please specify?
    c. Does your product offer dual authentication? (e.g., password, facial recognition, finger print,etc.)
10. Please discuss how data is managed
    a. What data is collected?
    b. What security features do you hold around the data (Advanced firewalls, intrusion detection, event logging, internal firewalls, encryption....)
    c. Who owns the data?
    d. Do you share access to the data with any third-parties? If so, on what terms/conditions?
    e. If a product collects personally identifiable information data on customers, what rights do those customers have to their data? (i.e. data mobility, informed consent on use of data)
11. What customer support features exist? (e.g., call center, in-person field staff) How are they used?
12. Do you allow remote feedback from users? If yes, what are the mechanisms?

User Uptake

13. How is the tool rolled out to users?
    a. How are users onboarded? (i.e. self onboarded, field agent onboarding)
    b. i.e. Is training needed, and if so, estimated training time / # of sessions?
    c. Do you supply hardware to any users?
14. Have users expressed if there are any features of the tool that made its adoption easier/faster?
15. What challenges have you experienced with the roll-out of the tool?
    a. Training needs for customers?
16. How many users does it have?
    a. Active users?
    b. By type? (i.e. farmer, agribusiness) By gender?
    c. By region? (If they don't know #s by division, get at least the divisions with active users)
17. What successes / results has the tool realized? (i.e. in uptake, on agricultural productivity and income)

Costs and Revenue-Making

18. What are your revenue streams? Who pays to use the service? What is your pricing model?
19. How do you calculate the revenue the tool brings to your business?
20. What was the tool's total revenue in 2021 and/or 2022?
    a. If they do not wish to say - can they tell if they had net positive revenues, or tell us about how that figure is changing?
21. What is your average revenue per user per year?
    a. If they do not wish to say - can they tell if they had net positive revenues/user, or tell us about how that figure is changing?
    b. Does this number change as you grow?

    c. Does it grow large or smaller as your customer base grows, or does it stay the same?
22. What are your customer acquisition strategies? What channels do you advertise through?
23. What is your customer acquisition cost?
    a. If they do not wish to say - what types of costs go into customer acquisition?

Growth

24. What are your plans to reach more users?
    a. Are there specific customer segments your organization is focusing on? Which ones and why?
25. Do you have plans to expand within your value chains or sell the tool to other agribusinesses?
26. Are there any new features or integrations you have planned? If so, what are they and what is the timeline for their deployment?
27. How have you developed financial projections for the tool? How do you use them on an ongoing basis?
    a. Trying to get to: Do you have an active business plan?
28. Please describe what you see as the Total Addressable Market for this tool. What is your target customer mix?
29. How do you segment this TAM for planning purposes?
30. What, if any, competitor digital tools are you aware of? How is your product differentiated?

Regulatory Environment

31. Are there specific regulations that present challenges to your service?

Enabling Environment

32. How easy is it to hire ICT workers?
33. Is your organization part of any ICT associations? If so, which ones?
34. Are you aware of any accelerators / incubators?
35. Which other service providers are you aware of that are innovating for digital technologies in the agricultural sector?

Last Thoughts

36. Is there anything else you think we should know? Advice to USAID?
37. Who else would you suggest we speak with? Can you provide contact information?
38. Could you give us phone #s for any users?

NOT USING DIGITAL TOOLS/SERVICES

Reasons for Not Adopting Digital Technology

1. Why have you not used digital technologies in your programs or activities?
2. What are the primary barriers to using digital technologies in your programs or activities?
    a. Cost?
    b. Digital literacy?
    c. Network connectivity?
    d. Preferences?
    e. Migrating systems and processes?
    f. Availability of hardware/options for affordable repair?
    g. Leadership and/or staff buy-in?
    h. Other?

Potential Use of Tech

3. Has your organization ever considered using any types of digital agriculture services for programs/activities in the past? If yes, what kind?
4. If you were to use digital agriculture services, who would this be catered towards? Value chain actors, including farmers, staff, administrative, etc.?

5. What steps would need to be put in place to implement this digital technology?
6. What level of training / capacity building would be required to offer this digital product?
7. Is this a product that you could build in-house or would you have to partner with a technology company?
8. If so, do you have an idea of the potential technology companies that you could partner with for this?
9. How could donor organizations like USAID best facilitate you in adopting digital technologies?
10. Which organizations are best suited to support you in adopting digital technologies?

Last Thoughts

11. Is there anything else you think we should know? Advice to USAID?
12. Who else would you suggest we speak with? Could you allow us to speak to a couple of farmers? Can you provide contact information?

RESEARCH INSTITUTIONS QUESTION SET

Background Info

1. Name of the organization
2. Name of the interviewee
3. Date of the interview
4. Please give us a quick overview of you /your institution's work/focus area, highlighting in particular your work with farmers, women, youth and value chain actors.

Agriculture Sector

5. What is your perspective on the performance of Zimbabwe's agriculture sector?
6. In your opinion, what are the key barriers to agriculture productivity in Zimbabwe?
    a. Do you think any of these could be addressed by technology or digital solutions?
    b. Are you aware of any solutions/products currently being used to address these challenges?

Institution Background

7. In your work, do you use digital tools to collect data? If yes, what kinds of tools do you use?
8. Do you share the data publicly, or is it only available to specific stakeholders?
9. Through which channels is the data shared?

Agriculture and Digital/ICT Tools

10. Which digital agriculture use cases does your research cover in Zimbabwe, or use to disseminate research findings and recommendations as highlighted below?
    a. Advisory: on topics such as agronomic/livestock best practices, pests and diseases, weather, and market information, including prices, as well as more sophisticated digital services and tailored farm management software
    b. Market linkages and E-commerce: value chain integrators, farm service providers, mechanization access services, e-commerce services, e-marketplaces
    c. Supply chain management: logistics, procurement, input quality assurance & anti-counterfeiting, traceability and certification solutions, supply chain ERP solutions
    d. Finance: payments, savings, insurance, credit and loans, credit scoring, etc.
    e. Ecosystem Support: data analytics solutions and digital decision support tools for useful country- and value-chain-level insights
    f. Other (please specify)
11. What changes have you seen with the digital and ICT tools developed for agriculture (i.e., functionality, affordability, usability)?
12. What factors inhibit or encourage adoption of digital/technological tools in the agricultural sector?
13. What is the appetite or interest of stakeholders such as farmers, and other value chain actors to adopt digital tools in rural areas?

Challenges and Opportunities

14. What challenges do you face when conducting digital agriculture research or disseminating research findings and/or recommendations?
15. What are the main gaps in technology infrastructure that are affecting the advancement of digital agriculture to farmers?
16. Are there gaps in the delivery of digital solutions to meet emerging demands of the agriculture sector?
17. Do you observe differences in technology adoption and usage between men, women and youth? If yes, what are common barriers prohibiting adoption and usage?
18. What challenges exist with inclusion of persons with disabilities and other linguistic minorities with adoption of digital technologies?
19. What opportunities do you see for digital and ICT tools/services to overcome some of these challenges?
20. What incentives could lead young people to be more involved with agriculture?
21. How important is technology and ICT to young people and women in agriculture?
22. Are you aware of any agricultural technologies or digital tools that were discontinued and why?
23. What are some policies/regulatory initiatives that have made the agri-tech ecosystem favorable? What opportunities exist to strengthen policies affecting the sector?
24. What digital solutions does the government offer farmers and other actors if any?

Last Thoughts

25. Is there anything else you think we should know? Advice to USAID?
26. Who else would you suggest we speak with? Can you provide contact information?

GOVERNMENT AGENCIES QUESTION SET

MINISTRY OF AGRICULTURE

Background Info

1. Name of the interviewee
2. Date of the interview

Digital/ICT Tools in Agriculture

3. What do you perceive to be the main challenges in the agricultural sector that impacts the adoption of digital tools/services?
4. What are the agency's policies, strategies and legislation around agricultural digitalization? Any specific document or publication to share?
5. Do you currently use and/or promote any public facing digital agriculture tools in your agency?
    a. If yes:
        i. Can you list some of the tools, their status (ongoing, discontinued, etc), and their usage rate?
    b. If no:
        i. What are the reasons why your agency doesn't use or promote any digital agriculture tools?
6. For which of the following use cases are most promoted by your ministry, and how are these use cases promoted? Could you describe or share links to some projects being implemented?
    a. Advisory: digitally delivered information on topics such as agronomic/livestock best practices, pests and diseases, weather, and market information, including prices, as well as more sophisticated digital services and tailored farm management software
    b. Market linkages and E-commerce: value chain integrators, farm service providers, mechanization access services, e-commerce services, e-marketplaces

c. Supply chain management: logistics, procurement, input quality assurance & anti-counterfeiting, traceability and certification solutions, supply chain ERP solutions
d. Finance: payments, savings, insurance, credit and loans, credit scoring, etc.
e. Ecosystem Support: data analytics solutions and digital decision support tools for useful country- and value-chain-level insights
f. Other (please specify)

Information Sharing

7. How do you communicate and share information with farmers, farmer associations, and other value chain actors?
8. What seems to be their preferred communication channel?

Challenges / Needs

9. What are the main challenges you face in carrying out the ministry's mandate?
10. What could be done to alleviate those challenges?
11. Do you think the regulatory framework used to promote the use of digital tools is adequate? Why or why not?

Last Thoughts

12. Is there anything else you think we should know? Advice to USAID?
13. Who else would you suggest we speak with? Can you provide contact information?

MINISTRY OF INFORMATION AND COMMUNICATION TECHNOLOGY

1. Name of the interviewee
2. Date of the interview

Digital/ICT Tools in Agriculture

3. Which licensed ICT service providers are targeted at the agricultural sector? Please name the interventions they provide.
4. What challenges have you encountered so far with service providers that service the agricultural sector?
5. Do you provide training support to the Agriculture ministry and by extension to agricultural value chain actors? List these areas of support.
6. What are the emerging initiatives of the ministry in the areas of market linkages, e-commerce, data analytics, data security, digital inclusion and network coverage that could impact the rural agricultural actors?
7. How is the ministry working to preserve the data of agricultural farmers and other value chain actors?
8. Does your office promote inclusion of digital tools innovators?
9. If yes to the above, how are the onboarding strategies and what are the cost implications?
10. Does your ministry promote digital finance and for instance digital payment use cases (including P2P, B2B, B2C, G2P,) targeted at the agricultural sector?

Network Infrastructure

11. What kind of communication infrastructure has coverage in rural Zimbabwe??
12. Are these services active? If yes, could you mention the services to impact the Agricultural sector?
13. If no to the above, have you ever been contacted by the agriculture sector for support?

Challenges and Needs

14. What are the main challenges you face in carrying out oversight and deployment of digital/ICT services?
15. What could be done to alleviate those challenges?
16. Do you think the regulatory framework used to promote the use of digital tools is adequate? Why or why not?

Last Thoughts

17. Is there anything else you think we should know? Advice to USAID?
18. Who else would you suggest we speak with? Can you provide contact information?

MINISTRY OF ENVIRONMENT

1. Name of the interviewee
2. Date of the interview

Adoption of Digital/ICT Tools

3. Provide your mandate under the categories below. Does your work promote digitization in these sectors? (i.e. especially in the wildlife and ecotourism sector)? If yes, please describe
    a. Weather
    b. Environment
    c. Climate
    d. Ecotourism
    e. Wildlife management
    f. Anti-poaching
    g. Illegal wildlife trade
    h. Water resources management
4. If not, why?
5. Do you use any digital tools on a daily basis in your ministry?
6. If yes, list all the tools, status and usage rate?
7. Has the ministry deployed any external facing tools that are used by extension agents, farmers, or others?

Challenges and Needs

8. Do you face any challenges with the use of ICT or digital tools in service delivery in the wildlife and ecotourism sector?
9. What are the main challenges you face in carrying out your ministry's mandate?
10. What could be done to alleviate those challenges?
11. Do you think the regulatory framework used to promote the use of digital tools is adequate? Why or why not?

Last Thoughts

12. Is there anything else you think we should know? Advice to USAID?
13. Who else would you suggest we speak with? Can you provide contact information?

POSTAL AND TELECOMMUNICATION REGULATORY AGENCY

1. Name of the interviewee
2. Date of the interview
3. Do you use digital/ICT tools in regulating programs by your service providers that work in the agricultural sector (If yes, please describe)?
4. If not, do digital/ICT tools hinder your work in any way? If yes, please explain.
5. What is the mobile network coverage rate in rural areas?
6. How is your ministry promoting expanded mobile network coverage in rural areas?
7. What are the challenges with expanding mobile network coverage in rural areas? How is your ministry addressing these challenges?
8. Are there any mobile network coverage inclusion targets? If so, can you share what the targets are?
9. Do you think the regulatory framework used to promote the use of digital tools is adequate? Why or why not?

Last Thoughts

10. Is there anything else you think we should know? Advice to USAID?
11. Who else would you suggest we speak with? Can you provide contact information?

FINANCIAL SERVICE PROVIDER QUESTION SET

BANKS / MFIS

Background Info

1. Name of the organization
2. Name of the interviewee
3. Date of the interview

Ag Products and Customers

4. What type of product offerings do you have for the agriculture sector (i.e. production, processing, distribution, marketing, administration? Which of these are delivered or offered digitally? Which are your most prioritized sectors and why?
5. How many customers do you have (by product)?
    a. Credit (i.e.,agri loan vs farmer personal loans)
    b. Agricultural Insurance (please define the type of insurance, weather index, yield index etc)
    c. Savings
    d. Payments
    e. Investments
    f. Other?
6. Who are your customers? (i.e. farmers, MSMEs, cooperatives, inputs dealers, etc.)
    a. Can you provide any details on the profile of these customers (I.e. average income, geographic location)
7. Describe your typical loan terms for the agricultural sector (rate, length, fees, collateral)?
    a. What is specific about these loans for the agricultural sector (i.e. aligned with harvesting/marketing cycles or festivities, such as Christmas or Eid)?
    b. Can you provide your lending market size by livestock?
8. How much is your lending portfolio annually?
9. How many active loan customers do you currently have? Do you break down this data by gender and age (youth)?
10. How much in deposits do you have from rural customers? Do you have this data broken down by gender and age (youth)?
11. What interest rate is given for savings?
12. What is the number of agricultural insurance customers? Do you have this data broken down by gender and age (youth)?
13. Can you provide the total hectares of farms or number of animals insured (if possible)?
14. Do you finance technologically inclined agricultural equipment for farmers? Please name the equipment and their value.
15. Are you planning on offering any new services or technologies in the next few years?

Service Delivery Challenges

16. Can you speak to some of the challenges you have faced in serving agriculture clients and rural customers?
    a. Any challenges unique to women, youth, persons with disabilities, or linguistic minorities?
17. How have you mitigated these challenges, if at all?

18. How has the COVID-19 pandemic affected your business / delivery of your services to the agricultural sector?
    a. Have you made any tool modifications / changes due to COVID-19?

Digital Services

19. Do you offer any digital services for the customers we just discussed?
    a. If yes:
        i. Please describe your digital services?
        ii. How do you facilitate the distribution of these services? Do you have an agent network, mobile app, mobile money, or USSD code?
    b. If no, please discuss why you have yet to utilize digital services to reach customers?
20. What challenges have you faced in offering digital services to customers?
21. Are there digital services that customers are less open to enrolling in?
22. What barriers, if any, do customers face in being eligible to use the digital services offered by your company? Are there any barriers unique to specific groups, like women, youth or farmers?

Lending Data Partnerships

23. What sort of data needs are you missing, or do many potential customers not have when making lending decisions in agriculture and/or rural lending?
24. Do you ever utilize third party data for lending decisions?
    a. If no, why not?
    b. If no, would you consider it? If yes, then what information would you need to make an informed decision?
    c. If yes, who are your third party partners?
    d. If yes, what sort of data sharing frameworks do you use?
    e. If yes, what sort of data are you leveraging?
    f. If yes, How are you leveraging the data?
    g. If yes, what is the commercial agreement to use the data?

MOBILE NETWORK OPERATORS

1. Can you share any type of connectivity map that shows where your network reaches?
2. What percent of the population do you cover with 2G?
3. What percent of the population do you cover with 3G?
4. What percent of the population do you cover with 4G?
5. How many airtime distributors do you have?
6. Data costs?
7. What are your key challenges in serving more rural customers?

General Agricultural Services

8. Do you have any agriculture-specific offerings on your platform?
    a. If yes:
        i. What services do you offer?
        ii. How is the service available (IVR, SMS, web-based, USSD, other)?
        iii. How many customers use the service?
        iv. What languages are the services available in?
        v. How did you roll out the service? Any digital tools adopted for user onboarding?
        vi. What were some of the challenges faced and how did you address them?
        vii. Are the services inclusive of women, youth, persons with disabilities, and linguistic minorities? If yes, how so?
    b. If no:
        i. Why not?

ii. Are there any initiatives planned for the agriculture sector?

Mobile Money

9. How many active customers (30 days) do you have?
10. Does your mobile money wallet have any agriculture specific services integrated with it?
11. How many active agents do you have? Do you have a breakdown of their locations, including percentages in rural areas? Do you have a gender and youth breakdown of your active agents?
12. What services do mobile money agents provide to rural customers? Any services beyond transaction support?
13. What is the volume and value of funds your platform processes on average monthly? Do you have this data disaggregated by gender?
14. Do you have any products that work specifically with rural customers (i.e. savings groups, farmer based organizations, distributors, processors, etc.)?
15. Do you face any unique challenges working with rural customers?
16. How do you envisage conquering these challenges?
17. What opportunities to work with rural customers exist? What opportunities do you see for rural services, particularly for the agricultural sector?