Case Study

IFAD

Conducting a Market Scan of Digital Agriculture Solutions

A Malawi Case Study

JengaLab

TechChange

DEVELOPMENT GATEWAY
An IREX Venture

CONDUCTING A MARKET SCAN OF DIGITAL AGRICULTURE SOLUTIONS

A MALAWI CASE STUDY

JULY 2023

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The Digital Advisory Support Services for Accelerated Rural Transformation (DAS) Program is a facility funded by a grant from the International Fund for Agricultural Development (IFAD). The DAS consortium of partners includes Development Gateway: an IREX Venture, TechChange, and JengaLab.

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TABLE OF CONTENTS

INTRODUCTION

DIGITAL AGRICULTURE SOLUTIONS FOR MALAWI

The Digital Advisory Support Services for Accelerated Rural Transformation (DAS) Programme is a facility funded by a grant from the International Fund for Agricultural Development (IFAD). The DAS consortium includes Development Gateway: an IREX Venture, TechChange, and JengaLab. Via rapid advisory deployments, the overall programme aims to provide smallholder farmers across Africa, the Middle East, and Central Asia with better access to digital tools and information to increase their income and strengthen their resilience.

In late 2022, the IFAD-DAS team worked with the IFAD-funded Sustainable Agricultural Production Programme (SAPP) in Malawi to complete this market scan and sustainability study. The How to Conduct a Market Scan Toolkit was leveraged to create this study.

Working With the SAPP Team

The SAPP team, which is embedded in the Department of Agriculture Extension Services (DAES) within the Malawi Ministry of Agriculture, provides smart messaging service (SMS)-based weather alerts and agricultural updates to farmers. Prior to the DAS programme, the DAES used a technical platform developed by Esoko to support 78,000 lead farmers across Malawi. This support was provided in conjunction with other partners and the United Nations Development Programme Modernised Climate Information and Early Warning Systems (UNDP M-CLIMES) project.

The Esoko platform required a licence fee and had high SMS transmission costs. For this reason, DAES ended its use of Esoko and developed its own platform (called Ulimi ndi Nyengo) in 2021. Currently, the system is free for farmers, and partners pay a fee based on the number of SMS messages that they send using the platform. The intention is to reach 200,000 farmers via the Ulimi ndi Nyengo platform.

CASE STUDY: MALAWI

The digital solution landscape in Malawi has expanded over the last decade. Of the 29 digital solutions mapped, 25 were launched between 2011 and 2021. The methodological approach used to create this Malawi case study, which is described in the aforementioned toolkit, is described in detail below.

STEP 1: ASSESSMENT OF THE DIGITAL ECOSYSTEM

Step 1.1 – Digital Ecosystem Overview

Secondary research: The secondary research is based on a review of four reports specifically focused on Malawi's digital agriculture ecosystem.[1] [2] [3] [4]

Primary research: The overview relies on insights gained from an IFAD mission to Malawi. During the mission, interviews were conducted with key informants from seven digital agriculture technology (agritech) service providers, eight broader ecosystem stakeholders, and individual farmers and extension workers. These interviews were combined with insights from the interviews with farmers on the accessibility of digital agriculture tools. In addition, 16 focus groups were held in four different Extension Planning Areas (EPAs) from different IFAD programmes. These included four focus groups with women (lead) farmers, four focus groups with men (lead) farmers, four focus groups with extension workers, and four focus groups with value chain partners.[5] [6]

Step 1.2 – Synthesis of Research Results

Value Chain Mapping

Agriculture is one of the key priority sectors in Malawi and the main foreign exchange earner, primarily from tobacco, but also from sugar, tea, coffee and cotton. In fact, agriculture contributes 40% of the country's total export earnings. Cereals and tuber crops are crucial to Malawi's agricultural and food economy. Maize is a major food crop that accounts for over 37% of the total land cultivated by

[1] CCARDESA. Digital Agriculture Country Study Annex: Malawi. Supplement to the Situational Analysis Report. Assessment of Digitalization in the Agricultural Systems of the SADC Region. Centre for Coordination of Agricultural Research and Development for Southern Africa. World Bank.; 2021.

[2] Koopman M, Cattaneo M. Deep Dive on the Digital Agriculture Technologies in Malawi. IFAD, JengaLab, TechChange, Development Gateway; 2022.

[3] Koopman M, Cattaneo M. Sustainability Agro Advisory Platform Ulimi ndi nyengo platform. Sustainability Agro Advisory Platform Ulimi ndi nyengo platform; 2022.

[4] USAID. Malawi Digital Agriculture Ecosystem Assessment. DAI-led Digital Frontiers project. USAID/Feed the Future; 2022.

[5] Koopman M, Cattaneo M. Deep Dive on the Digital Agriculture Technologies in Malawi. IFAD, JengaLab, TechChange, Development Gateway; 2022.

[6] Koopman M, Cattaneo M. Sustainability Agro Advisory Platform Ulimi ndi nyengo platform. Sustainability Agro Advisory Platform Ulimi ndi nyengo platform; 2022.

smallholder farmers. It is also the fourth largest produced crop after sweet potatoes, cassava, and sugarcane. However, Malawi's dependence on rain-fed agriculture makes it highly susceptible to climate change.

Smallholder farmers are a dominant force in Malawi's agriculture landscape, producing over 80% of the country's food and 20% of its exports. Smallholder farmers, who are the main actors in the agri-food system, are based in remote areas with limited access to digital technology tools and farm inputs (such as fertiliser, seeds, and machinery). Most farmers in the country are more than 50 years old, and significant numbers of farmer households are led by women. In fact, women account for 70% of all farmers, undertake 70% of all agricultural activities, and produce about 80% of Malawi's subsistence crops.

Agritech

Although local businesses are adopting digital technology including social media (Facebook, Twitter, Instagram, and WhatsApp) and other digital marketing tools, the penetration of social media in Malawi is low in comparison to other countries in the region. The mobile penetration rate is also low – in 2018, mobile penetration stood at 44%, while smartphone use was only 10%. The low-income levels and lack of disposable income hinder the uptake and use of Agritech.

More than 20 organisations and programmes support the growth of Malawi's entrepreneurship and innovation ecosystem, including mobile and web application development companies, incubators, accelerators, and hubs. These organisations have been supporting the growth of agritech through capacity building, fundraising, mentoring, and networking services.

Digital Accessibility

Rural populations in Malawi struggle with access to phone networks, internet services, and electricity. Many farmers are illiterate, and smartphone penetration is low. Lack of access to network connectivity, high data costs, and low (digital) literacy are common barriers to technology adoption.

Digital Divide and Gender Bias

Only about a third of the agricultural land in Malawi is owned by women. Female farmers are less productive than their male counterparts due to differences in the level of knowledge and poor accessibility to farm inputs that improve productivity. Limited access to financial resources, low education levels, and reduced labour availability due to gendered expectations (as women are the main caretakers of their families) are other factors that affect the participation of women in agricultural value chains.

Moreover, lower education levels limit the ability of women to adopt modern and technology-based farming practices. Low digital literacy constrains the adoption of new technologies, especially in an ageing rural population.

Policy and Regulatory Environment

The government of Malawi has played a crucial role in adopting and using digital solutions to enhance service delivery. The government has established policies and strategies for digitising the economy in recent years. For instance, the recently launched Digital Economy Strategy (2021-2026) seeks to enhance the performance of critical sectors (such as agriculture) via adoption of digital innovations. The strategy prioritises the use of digital solutions (such as digital extension services and digital platforms) to improve competitiveness and create new employment opportunities in the agriculture sector. The National ICT Policy also seeks to improve delivery of ICT services to rural areas and vulnerable and disadvantaged groups. The policy recognises the importance of agriculture in the economy and recommends the utilisation of ICT in agricultural extension services, research and development, and agricultural marketing. Similarly, the National Agricultural Policy of 2016 seeks to establish effective, demand-driven agricultural innovation systems for research, technology generation, and dissemination. The government has also conceptualised and developed a National Agriculture Management Information System as a central public platform for agriculture data in the country.

In the National ICT Policy and the National ICT Master Plan, specific mention was made to encourage the utilisation of ICTs in the priority growth sectors including the agribusiness industry, agricultural extension services, and research in agricultural production and processing. On the agricultural front, the Digital Economy Strategy (2021-2016) does not only focus on increasing access to digital services by smallholder farmers and other stakeholders; it also encourages the utilisation of innovative Internet of Things (IoT) technologies and smart farming/open data portals. In addition, it makes specific references to online platforms. The key agricultural objectives outlined under the Malawian Digital Economy Strategy are: 1) help farmers access high quality inputs and plug into a rich commercial market supported by a variety of platforms; 2) leverage digitally-delivered services to support modern farming practices and increase productivity; 3) create rich and up-to-date data that provides the latest view on agricultural activity and supports innovation, monitoring, and investment.

Donor Development Institution Programmes, Innovation/Entrepreneurship Programmes, and Interventions Supporting the Uptake of Digital Solutions

Malawi is emerging as a key focus country for regional programmes that support innovators. Such programmes provide innovators with financial and non-financial support to scale across geographies and customer segments. Most agritech service providers in Malawi rely on funds from donors (either from one donor that supports the programme or multiple donors on a project-by-project basis) and are not yet sustainable.

Close to 20 programmatic interventions with components that enhance access to and uptake of agritech solutions have been launched by donors and other philanthropic organisations in the last 10 years. The main donors include the Food and Agriculture Organization, USAID, Clinton Development Initiative, European Union, GIZ, UNDP, World Bank, and United Nations. Around 55% of ongoing donor programmes directly work with existing agritech providers to implement interventions, while the rest work with their implementation partners to design, launch, and run their own digital solutions and platforms. The government, donor institutions, and private stakeholders are working to enhance farmer access to phones, which is essential for the uptake of agritech.

Needs of Smallholder Farmers and Other Relevant Actors

The following main challenges facing farmers in Malawi can be considered as potential use cases for agritech solutions:

- Inadequate access to agronomic and market information
- Frequent pests and disease outbreaks
- Climate change and unpredictable weather patterns
- Intermediaries depleting value for smallholder farmers
- Lack of visibility in the agricultural inputs and outputs markets
- Lack of aggregated data and information on the sector

STEP 2. REVIEW OF THE EXISTING AGRITECH SOLUTIONS IN MALAWI

Secondary research: The desk research assessment of existing digital solutions is based on a report by the Centre for Coordination of Agricultural Research.[7]
Primary research: The assessment also relies on insights gained from an IFAD mission to Malawi.[8]

Summary for the Agritech Solutions Database

Individual descriptions of the different agritech solutions operating in Malawi can be found in the annex of this case study. A summary of these descriptions is provided below.

The digital solution landscape in Malawi is still nascent as it has primarily evolved in the last decade. Of the 29 agritech solutions currently mapped, 25 were established between 2011 and 2021. National government bodies and agencies as well as commercial agriculture companies were the most common actors involved in the development and implementation of innovative agricultural solutions. For Malawi-specific innovations such as Khusa (Village Savings App) and Zaulimi, community organisations, local CSOs, donor programmes, and/or entrepreneurs support innovation development. Some of the innovations within Malawi address the knowledge gap (16 of 29 total innovations), low productivity (15 of 29), poor access to markets (13 of 29), and climate change (11 of 29). More specifically, the innovations seek to address low agricultural productivity and increase farmer profits by improving access to information, export markets, agricultural extension services, and financial services. Most of the innovations generate revenues from business or individual subscription fees and donor subsidies. For Malawi-specific innovations, all but one innovation (i.e., the government-led DAES v1 extension app) requires additional funding for support.

USE CASES: The main use cases for digital solutions in Malawi focus on the provision of general agronomic and market information as well as the delivery of precision agriculture advisory and farm management services. Other use cases look at enhancing market access and linkages and improving supply chain management and financial inclusion. Most of the agritech solutions focus on solving

[7] CCARDESA. Digital Agriculture Country Study Annex: Malawi. Supplement to the Situational Analysis Report. Assessment of Digitalization in the Agricultural Systems of the SADC Region. Centre for Coordination of Agricultural Research and Development for Southern Africa. World Bank.; 2021.

[8] Koopman M, Cattaneo M. Deep Dive on the Digital Agriculture Technologies in Malawi. IFAD, JengaLab, TechChange, Development Gateway; 2022.

multiple challenges across agricultural value chains, with digital agricultural advisory being the dominant focus area. All use cases are being executed in Malawi, but there is a clear gap between agri-digital financial services and smart farming.

LAUNCH DATES: Twenty seven innovations in Malawi were developed between 2009 and 2019 (six in 2019, four in 2020, four in 2016, two in 2017, and the rest in previous years). Two innovations were launched in 2021. The oldest innovation is the 'Farmer Radio Program' by Farm Radio Trust, which was established in 2009.[9]

VALUE CHAIN FOCUS: Surveyed innovations in Malawi address all stages of the value chain. On-farm production is the most common value chain area (18 of 29 total innovations), followed by cultivation planning, market accessibility, and post-harvest activities. Storage and transport had the least number of solutions. Given the importance of cereals (such as maize, sorghum, and rice) and legumes (like soybeans and groundnuts), a large proportion of the solutions focus on enhancing performance across cereal value chains. Several solutions also focus on supply chain management for the livestock, fruit, and vegetable value chains. A significant number of agritech solutions focus on multiple production phases. Other solutions, particularly market linkage and e-commerce platforms, focus on increasing accessibility to agricultural inputs and outputs.

TARGET AUDIENCE: Innovators in Malawi mostly target their innovations at communities (16 of 29 total innovations) and individuals (16 of 29), followed by businesses (13 of 29), households (13 of 29), and the government (12 of 29). Farmers are the primary users of 17 innovations. Cooperatives (11 of 29) and extension workers (11 of 29) are the next most common. Non-government organisation (NGO) staff were the least common users (6 of 29).

AGRITECH SERVICE PROVIDER: Majority of the agritech solutions used in the country are foreign-owned, with most scaling from other African countries. Out of the 29 solutions, only 11 are home-grown and headquartered in Malawi. Meanwhile, 13 have been scaled from other African countries – largely from Kenya and Ghana – while the remaining five have their headquarters in Europe, America, and Asia.

Database Results for the Agritech Solution Case Study

The following table is an example of a database result for an agritech solution. Ulimi ndi Nyengo was used in this example as the IFAD-DAS team had familiarity with it after completing the assessment. For more information on completing a full market scan, read the Toolkit for Market Scans.

Name	Ulimi ndi Nyengo Platform
Use case; subcase	Advisory; Precision Agriculture/ Farmer Information Services/ Participatory Advisory/Farm management
Year of launch	2021 (previously MoA used a non-free agro advisory platform called Esoko)
Value chain focus	N/A

[9] CCARDESA. Digital Agriculture Country Study Annex: Malawi. Supplement to the Situational Analysis Report. Assessment of Digitalization in the Agricultural Systems of the SADC Region. Centre for Coordination of Agricultural Research and Development for Southern Africa. World Bank.; 2021.

Name	Ulimi ndi Nyengo Platform
Target users	Smallholder farmers; Farmer groups of IFAD-supported programmes (SAPP, PRIDE, TRADE); Value chain actors; Extension workers; Development partners/NGOs
Agritech service provider	Government-owned: DAES of Malawi; National Smallholder Farmers' Association of Malawi
Technology type	SMS-based application
Engagement (registrations; active users)	78,000 (lead) farmers; N/A
Institutions funding/investing in solution development	UNDP (M-CLIMES project) and SAPP; DAES can sustain the platform after the SAPP project support stops.
Integration with other platforms such as WhatsApp (indicate the platform or just type "no")	No at the present time, but potential for scaling up and migrating to a WhatsApp platform.
Inclusion (users by gender and age)	N/A
Hardware required (tablets, smartphones, basic phones, laptops/desktops, others)	All types of mobile phones
Network requirements (offline, 2G, 3G, 4G, 5G)	At least 2G
Data; owner of the data	Database on farmer profiles; government-owned
Type of support centre (none, call centre, in-person field staff)	None
Pricing of the service for the final user	Free for farmers but SMS costs are incurred. Partners also pay a fee based on the number of SMS that they send.
Training needed? (yes/no)	No
Technology Readiness Level (TLR) 1 through 9	TLR-8; system complete and qualified
Potential for replication/scaling up of the solution	Grow to around 200,000 farmers; migrate to a WhatsApp or a smartphone app platform. SAPP is looking for other partners to support this growth.
Already adopted by any of the identified actors in Step 1 *(yes/no)*	Yes

Name	Ulimi ndi Nyengo Platform
Contact information	Department of Agriculture extension Services (DAES) of Malawi
Description	A two-way SMS platform that sends advice that is actionable, accurate, and inclusive. The automated platform can schedule delivery of various messages (e.g., about good agricultural practices in selected value chains, weather forecasts, and event invitations). It has a simple sign-up system for farmers. Once registered, farmers can network with other value chain actors. Benefits: Farmers receive advice to cultivate more and better-quality produce and fight pests and diseases. Farmers also have access to an early warning system and can easily contact cultivation experts. Direct contact via SMS/web also reduces travel costs for extension workers.

STEP 3. ALIGNMENT BETWEEN THE AGRITECH SOLUTIONS AND THE ECOSYSTEM REQUIREMENTS

According to the research and analysis from Steps 1 and 2, and following the methodology proposed for Step 3, the case study of the Ulimi ndi Nyengo platform presents a relative relevance score of 32 out of 39 points (82%).

ID	Criteria to Assess the Degree of Alignment	Relevance (i.e., score)
1	Alignment of the solutions with the principles and objectives of the IFAD ICT4D Strategy	3
2	Contribution to the target indicators of the IFAD ICT4D Strategy	2
3	Rating of the different digital solutions against the Principles for Digital Development: Design with the user, understand the existing ecosystem, design for scale, build for sustainability, be data-driven, open, and collaborative, reuse and improve, and address privacy and security.	2

4	Relevance of digital solutions in mitigating and adapting to climate change	3
5	Alignment with existing technological, legal, and regulatory policies and policies that are currently in development in the country (see Step 1)	3
6	Solutions that are tailored and adaptable to community needs and resources	3
7	Solutions use case (and sub-use case) matching farmer needs and challenges	3
8	Solutions that are affordable, accessible, and appropriate for emerging economies, specifically rural or remote areas where electricity and internet may be unreliable	3
9	Scalable solutions that can reach more farmers and agribusinesses and magnify gains in productivity, efficiency, and livelihoods	3
10	Inclusive solutions that ensure that benefits are equitably distributed and reach the greatest numbers of people	1
11	Solutions that are sustainable over the long term	2
12	Homegrown solutions headquartered in the country of interest	3
13	Trust and transparency: Solutions with clear contractual or legal conditions stipulating who can access or use particular datasets, and for what purpose; mechanisms for secure data storage and management; information on how data will be used and shared via closed or open models, and details on how generated value will be distributed.	1
RELEVANCE: TOTAL SUM OF SCORES		32

ANNEX 1

Identified Agricultural Innovations Operational In Malawi[10]

For descriptions of the innovations, see Table 7 here.

Type of innovation	Name of Innovation	Name of the Company	Description of Innovation
Digital Advisory Agri-Digital Financial Services Digital Procurement Agri E-Commerce	Chiweto Insurance	Enterprise Innovation Hub	Chiweto Insurance is in the development phase but intended to launch in 2022. It aims to provide livestock insurance services (life and health insurance).
Digital Advisory	Chiweto SMS Platform	Enterprise Innovation Hub	Chiweto SMS Platform is an interactive digital service for sourcing and delivering information (such as advisory and agricultural extension information) in real-time via SMS.
Digital Advisory	Communicatio n Platform	Farmers Union of Malawi (FUM)	FUM Communication Platform is an internet-based product that can send bulk short messages to farmers that have their mobile phone numbers uploaded into the system. FUM is managing the platform in partnership with Agriculture Commodity Exchange for Africa (ACE). The platform provides information on crop production techniques (plant spacing, fertiliser application, harvest storage) and input prices and suppliers. The platform bridges the information gap that has existed between farmers and other value chain actors like private companies and extension advisory service providers. The platform is cheap and easy to verify. The platform has contacts of leaders of farmer organisations representing major commodities such as legumes, dairy, cotton, coffee, tea, sugar, beef, and others. It also has contacts of District Farmer Union (DFU) leaders from all EPAs in Malawi.
Digital Advisory	DAES v1	Ministry of Agriculture	DAES v1 is an Android app that is designed to target farmers, extensions workers, and other stakeholders. The app provides agricultural advisory services, extension worker contacts, marketing information, and

[10] Centre for Coordination of Agricultural Research and Development for Southern Africa, World Bank Group. Digital Agriculture Country Study Annex: Malawi. 2021/2022. https://www.ccardesa.org/sites/default/files/knowledge-products/CCARDESA%20Digital%20Agriculture%20County%20Study%20-%20Malawi.pdf

			climate and weather forecasts. The app is fully funded by the Malawi Ministry of Agriculture. It is a free smartphone-based service that is available to all. Further scaling is necessary to increase the usage of the app by every farmer and agriculture agent across the country.
Digital Procurement	E-License Application for Exporters of Agriproducts and Agricultural ERP	Twenty Third Century System	Farmers apply for export licences online using a clean and friendly user interface. Operational in Malawi, Mozambique, Namibia, Tanzania, Zambia, and Zimbabwe with 135 registered users.
Digital Advisory	Esoko Platform	Esoko	Esoko was established in Ghana. It is an agricultural profiling and messaging service that provides automatic and personalised price alerts, buy and sell offers, weather information, agricultural tips, and voice-based services. Its services have expanded to include data collection, biometric profiling, analytics, communication services, digital credit, insurance, and payment services. The aim of the innovation is to reduce the cost of communication and improve value chain management for stakeholders in the agricultural sector. Developed in Ghana, the innovation is implemented in several African countries and is currently being used in Malawi by the Ministry of Agriculture.
Digital Advisory Agri E-Commerce	Farmer Radio Programs	Farm Radio Trust	This is a radio programme that educates, informs, and equips farmers with the required knowledge about sustainable agricultural practices.
Digital Advisory Agri E-Commerce Smart Farming	Fruitlook	eLeaf BV	Fruitlook is a web-based portal with near real-time data based on satellite and remote sensing data modelling for the Western Cape agricultural sector. The Fruitlook portal delivers weekly remote sensing data year-round to subscribing farmers. Fruitlook incorporates a suite of data products covering crop growth, evapotranspiration deficits, and crop nitrogen status. These data products are relevant for orchards, vineyards, pastures, rangelands, and field crops. The quantitative and spatial information on water, vegetation, and climate is designed to enable farmers to better understand the effects of their water use and their farm management decisions. The Fruitlook data and team inform farm operations on management decisions relating to irrigation scheduling and crop production. The service is free of charge and funded by the Western Cape Department of Agriculture. It also provides metrics such as biomass production, evo-transpiration, water use efficiency throughout the year. Launched in 2010, Fruitlook has 500 active users and 2000 registered users

			Weather information: Fruitlook provides regional and localised weather forecasts as well as weather-adaptive and climate-smart advice to support optimization of assets (such as irrigation equipment) and resource use. Computers, satellites, sensors, drones, big data and analytics, and artificial intelligence (AI) tools are used to eliminate knowledge gaps by farmers. As a private company, Fruitlook has also received support from the Western Cape government. The company, which addresses pain points related to planning, inputs, and on-farm production, faces challenges with the level of digital literacy, low farmer uptake, and behaviour change. Fruitlook covers over 300,000 hectares and has sustainable reduced water use in farms and catchment areas by an average of 10% (30% in some cases). It is an integral part of the Western Cape Department of Agriculture's climate change response strategy. The technology has been developed with others and has taken active approaches to ensure its inclusivity, particularly among disadvantaged groups.
Digital Advisory Digital Procurement Smart Farming	GeoFarmer	GEOTERRAIMAGE (Pty) LTD	GeoFarmer was established in 2017 and has combined innovations in smart farming, digital advisory, and e-commerce. GeoFarmer has been deployed across the entire Southern African Development Community (SADC) region. GeoTerraImage is a private sector company which provides actionable intelligence through monthly crop monitoring. The GeoFarmer-©-Crop monitoring platform supports precision farming and provides accurate information about crop trends and statistics via a cloud-based dashboard. Through the use of computers, satellites, and earth observation, the innovative solution provides visual maps and illustrations, statistics, and trends for each field or farm being analysed (e.g., on crop type, crop growth stages, land suitability, and crop irrigation), It guides decision making around farm management and practices for more efficient and sustainable production. GeoTerraImage has reached wide-scale adoption and operates in Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe. Through specialised software, proprietary algorithms, and applications, GeoTerraImage uses remote sensed data to create spatial information. It combines advanced information and reporting to enable analysis, quantification, and monitoring. GeoTerraImage charges business subscription fees for its fully commercial product and believes its technology serves underrepresented groups.

Digital Advisory	Intelligent Monitoring Systems (iMoSyS)	IMOSYS	iMoSyS provides software, hardware, and engineering services for the remote monitoring of industrial processes and infrastructure. iMoSyS provides farm management services and has deployed smart irrigation systems that utilise sensor technology and soil analytics.
Agri-Digital Financial Services Digital Procurement	Khusa (Village Savings App)	Angle Dimension	Khusa (Village Savings App) is an online platform that allows community savings groups to automatically connect to the formal financial sector. The platform aims to enhance trust and bridge the divide between rural groups and banks, mobile money providers, and microfinance institutions. Khusa provides real-time information, calculates a portfolio, and enables payments. It enables groups to digitise their transactions and securely save money.
Digital Advisory Agri-Digital Financial Services Digital Procurement Agri E-Commerce	Kurima Mari (LimaMali)	Welthungerhilfe	Kurima Mari is an Android application designed to help smallholder farmers access extension advisory and market linkages using a smartphone.. It prevents the smallholder farmer from overly depending on extension officers and failing to find markets. It enables smallholder farmers to make informed choices about participating in agriculture value chains. The app, which includes Kurima Mari - Beef and Kurima Mari - Poultry, also provides digital support tools such as gross margin calculators and seasonal calendars that ensure farmers make the right choices about input investments and production practices. It is operational in Malawi and Zimbabwe with 84,719 registered users.
Digital Advisory	M'chikumbe 212	Airtel Malawi	M'chikumbe 212 is a mobile agriculture service launched in 2016. It is a platform where all agriculture-related information can be accessed for free, with the aim to enhance the stretched agricultural extension network. M'chikumbe aims to transform farming using mobile technology and increase Airtel's subscriber base, revenue, and brand loyalty in rural Malawi. M'chikumbe 212 is an interactive voice response (IVR) and SMS content platform that does not require any internet connectivity. Farmers, cooperatives, suppliers, traders, government staff and agencies, and NGOs are all considered the target audience and users. Since its launch in 2016, the platform has registered over 700,000 users and reached about 70% of Malawian farmers. The platform connects buyers with producers, farmers, cooperatives, and even other programmes.
Digital Advisory	Mlimi Hotline (Farmer Call Centre)	Farm Radio Trust	Mlimi Hotline (Farmer Call Centre) is a direct response information service dedicated to providing farmers with advice, information, and answers to pressing questions.

Digital Advisory Smart Farming	Mlimi Manager	Agricentre	Mlimi Manager by Agricentre is based on IoT and AI technology. The innovation collects different types of field data and saves it in a central data warehouse. Data is collected on soil fertility, soil moisture and soil PH for farm management. The data will be used to train different AI models.
Agri-Digital Financial Services Digital Procurement Agri E-Commerce	Mukuru App	Mukuru Africa	Mukuru Money Transfer Limited is a private sector company operating regionally (in Botswana, DRC, Eswatini, Lesotho, Malawi, Mauritius, Mozambique, South Africa, Tanzania, and Zimbabwe). The application addresses a knowledge and access gap and provides access to markets and financial services. Mukuru App was launched in 2019 and allows customers to create orders for remittances individually and initiate payments. The app can also be used to self-register a customer on the platform, with verification taking 24 hours. The innovation uses SMS, USSD, a smartphone app, website, dashboard, and social media platforms (Facebook, Twitter, WhatsApp, and Messenger). The platform also uses local and cloud-based databases (Excel, MS Access, SQL) and AI platforms (IBM Watson) for machine learning. Regionally, it has 500,000 users and 1 million registered users. It enables farmers to sell directly to consumers and enterprise customers such as hotels, restaurants, and market retailers. Challenges include digital literacy, device sharing, lack of mobile coverage, and financial sustainability of the business models in different locations. The application has reached a sustainable scale and is focused on individual users. The revenue model is based on transaction fees, and the in-house development team of the app and platform includes members of disadvantaged groups.
Digital Advisory Agri-Digital Financial Services Digital Procurement Agri E-Commerce Smart Farming	My Bank App	Sir Hackson Processors	My Bank App is in development. It will enable farmers to transact, access other financial services, and learn about agricultural practices. Sir Hackson Processors currently provides information on agricultural products and vaccinations schedules through SMS.
Digital Advisory Digital Procurement	SHERPA	Blue North Sustainability	SHERPA was launched in 2019. It expertly guides and supports businesses on the challenging and complex journey of achieving true and lasting resilience, viability, and sustainability. It is operational in Malawi, South Africa, and Zambia. SHERPA is an integrated on-line management system specifically designed to support and empower business owners, managers, and management teams within agricultural supply chains in the development and implementation of proactive, relevant, and impactful sustainability strategies. It provides its 305 registered users (52 of which are active) with tailored, agro-climatic, and crop-specific

			information that supports decision-making, maximises productivity, and reduces costs. Technologies such as sensors, satellites, and drones, as well as big data analytics and AI, underpin many of these services. Record keeping: Digital tools that enable farmers to keep detailed records of livestock, including health and feeding data, to help mitigate diseases and avoid missed conceptions. Record-keeping tools are also used to keep details of input usage, procurement, costs and revenues, and sales records. ISHERPA enables farmers to develop, manage, measure, and report on sustainability strategies. It covers all aspects of sustainability in a holistic and integrated way. The innovation helps build greater resilience and viability and uses computers, landlines, a website, geographic data, and cloud-based databases. The SHERPA advisory services bridges knowledge gaps and helps farmers report on multiple prescriptive standards. However, SHERPA has been hampered by digital literacy limitations, poor access to devices, data collection difficulties, low farmer uptake, lack of mobile coverage, and inflexible end-user behaviour. Despite these problems, SHERPA facilitates planning, on-farm production, and post-harvest processing. It also improves access to markets. SHERPA is planning to scale to other countries using internal resources. SHERPA generates revenue from individual and business subscription fees as well as an aggregated reporting service powered by Microsoft Power BI. SHERPA has worked with Netherlands-based Hydrologic to ensure water systems are weather-resistant and climate adaptive. SHERPA has also worked with Pixofarm, a company that has developed an app-based system to accurately monitor farm yields. SHERPA uses noise-resistant image processing, ML, and AI for forecasting and accurate fruit analysis.
Digital Advisory	Skudu Exact	skudu.co.za	This is an innovation implemented in Malawi, Mozambique, Namibia, South Africa, and Zimbabwe. Skudu Exact launched in 2019 provides. It enables farmers and agronomists to effortlessly implement plant nutrition guidelines across multiple fields. Based on soil and leaf sample analyses, Skudu's algorithm generates guidelines for lime, gypsum, fertiliser, and foliar feed according to the crop, growth stage, and region. Skudu has 400 registered users and 50 active users. However, bridging time and the technical capacity to generate plant nutrition guidance (i.e., content) are current challenges. Low farmer uptake and the technical usability of the platform are additional constraints. Skudu is planning to scale, backed by

			technology investors and revenue generated from business subscription and transaction fees.
Digital Advisory Agri-Digital Financial Services Digital Procurement	Small-Scale Farmer Seed Production	Good Nature Agro	Small-Scale Farmer Seed Production is an integrated agriculture digital tool that can monitor the production, logistics and supply of the legume value chain products and services. It has 15,000 users in Zambia and Malawi.
Agri-Digital Financial Services Digital Procurement Agri E-Commerce	Smart Identity e-KYC	Angle Dimension	Smart Identity e-KYC aims to address the know-your-customer issues that are prevalent in the financial sector. The innovation is aimed at industries such as banks, telcos, government agencies, insurance companies, and NGOs. The solution helps businesses simplify the onboarding of customers and uses facial recognition, fingerprint readers, and quick-response codes as elements of a digital ID.
Digital Advisory Agri-Digital Financial Services Digital Procurement Agri E-Commerce Smart Farming	SmartFarmer	Riskflow DBS	Launched in 2019, SmartFarmer is an agriculture value chain connector that links agricultural communities to value-adding services via networks with markets, suppliers, service providers, other farmers, and relevant government departments. It provides user-friendly, efficient, and flexible ICT-based services which cut across many functions and access channels. SmartFarmer improves the transparency, accountability, and efficiency of farming communities while driving profitability. It supports farmer-to-farmer, funder-to-farmer, and government-to-farmer interactions, price tracking and reporting, and the sending and receiving of agricultural alerts. It also facilitates bids and offers on commodities, provides location services, and pushes information on best practices, crop planning, and e-extension services. Moreover, it includes a national and regional-level pest and disease early warning system. However, it requires a farmer to upload a picture of an infected plant for diagnosis. SmartFarmer assists farmers throughout the production cycle - from planning to sale - whether locally, regionally or globally. SmartFarmer further enables farmers to keep detailed records of livestock, including health and feeding data, to help mitigate diseases and avoid missed conceptions. Record-keeping tools are also used to keep details of input usage, procurements, costs and revenues, and sales records. The value-added services are delivered via voice channels (IVR, helplines), text channels (SMS and USSD), and apps. A CashFlow Optimizer tool - an open, integrated, and adaptive web-based platform, also provides information on dealers and counterparties,

			thereby allowing for intelligent financial performance monitoring. One final benefit of this innovation is the provision of income statements, balance sheets, and cashflow records to farmers. This information helps farmers access loans and keep their data digitally up to date and open for appraisal by financial institutions. It also improves yields through third-party software - for example, SmartFarmer has partnered with Skudu to provide fertiliser and insure yields via an 'area yield index-based insurance model' from PULA, its insurance partner.
Digital Advisory	Viamo Platform	Viamo	The Viamo platform is deployed in the Democratic Republic of Congo, Madagascar, Malawi, Mozambique, Tanzania, Zambia. Viamo is a global Mobile for Development (M4D) social enterprise that aims to improve lives via the power of mobile technology. With a presence in more than 20 major markets in Africa and Asia, Viamo specialises in mobile engagement and information and communication technology for development. Viamo connects organisations with individuals through digital technology, allowing every party to make better decisions. In other words, it provides market linkages between farmers and consumers. It uses voice channels (IVR, helplines) text channels, and apps for information dissemination and data collection. Farmers can use these channels to receive climate and market price information. For a fee, development partners can use the platform to develop and disseminate content to existing subscribers. Launched in 2017, Viamo has about 300,000 smartphone users and 8.5 million registered users in the SADC region. Viamo has reached a sustainable scale and charges commercial rates as a social enterprise. However, understanding the market and user needs, device sharing, poor mobile coverage and electrical connectivity, and low farmer uptake (especially by women and girls) are among Viamo's key challenges.
Digital Advisory Digital Procurement Agri E-Commerce Smart Farming	Virtual Ranching Farming Program	Virtual Farming Pty Ltd	Virtual Ranching Farming program (VRFP) is an e-commerce platform and mobile application that allows farmers to buy and trade livestock and horticultural farm produce. The farm products are insured by reputable companies to avoid any losses and cover all risks. The trading of quality livestock and farm

			produce will help Botswana improve its food security and become accessible to international markets.
Digital Advisory Digital Procurement Agri E-Commerce	Zaulimi	Agricultural Commodity Exchange for Africa (ACE)	Zaulimi is a mobile application which provides farmers and extension officers with essential production and marketing information about select crops, livestock, and baobab goods. Farmers are presented with detailed information on climate and soil requirements, planting periods, manure and fertiliser application, weeding, pest and disease control, and harvesting and storage. The featured crops include groundnuts, maize, and soya. The content can be accessed offline. Market price information for major crops that are traded through ACE are also featured in the app. The app contains contact details of ACE field officers, government extension officers, and public service providers.