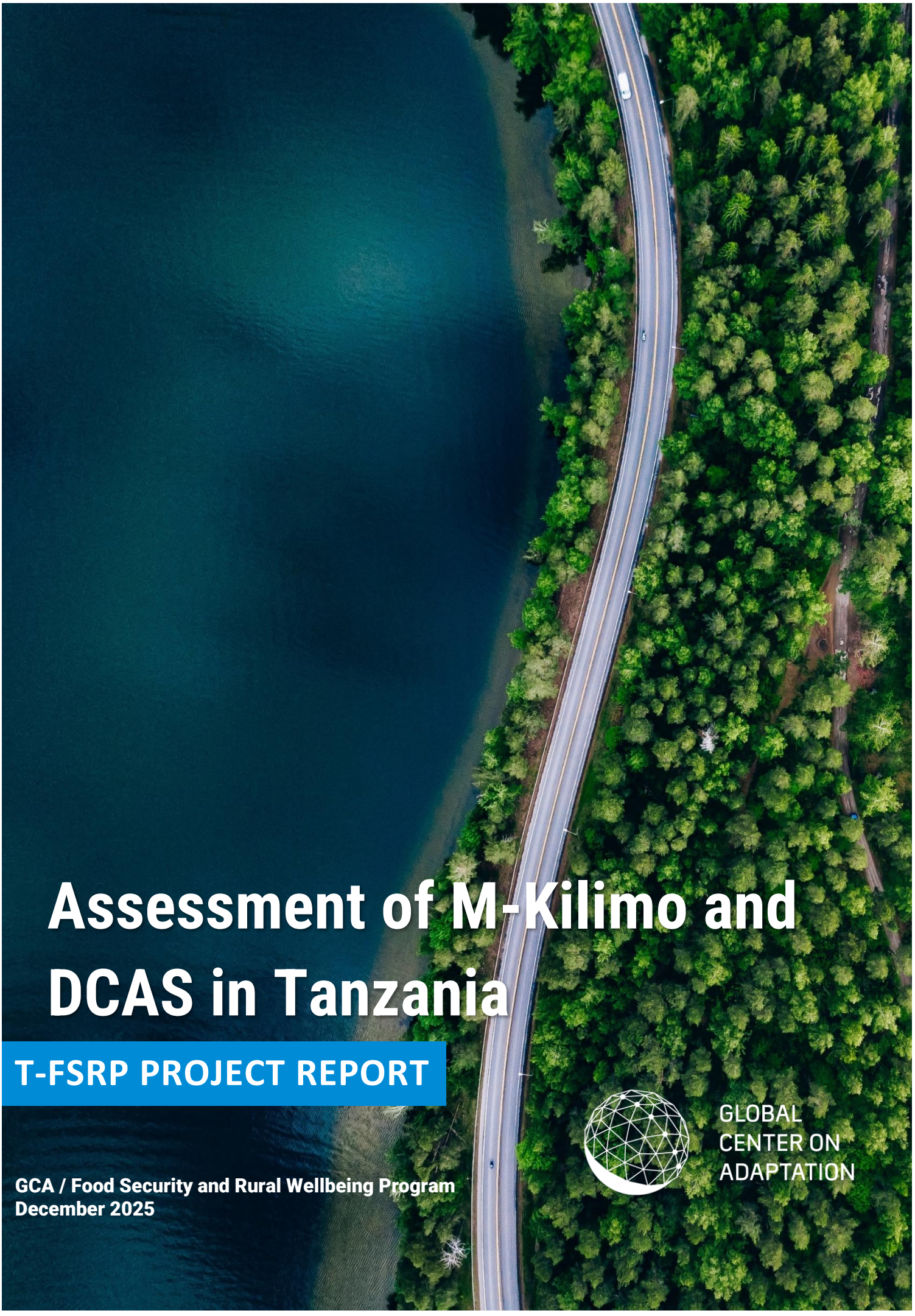

Assessment of M-Kilimo and DCAS in Tanzania

T-FSRP PROJECT REPORT

GLOBAL CENTER ON ADAPTATION

GCA / Food Security and Rural Wellbeing Program
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AUTHORS & ACKNOWLEDGEMENTS

This report was developed by

Global Center on Adaptation:
Kimwaga Mhando

Partnerships:
World Bank

Consultants:
Weather Impact, Esoko and TARI

DESCRIPTORS

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Contact: joanne.hullegie@weatherimpact.com (Weather Impact), lorenzo.occelli@weatherimpact.com (Weather Impact), patrick@esokotz.com (Esoko), hadija.ally@tari.go.tz (TARI)

Acknowledgements:

GLOBAL CENTER ON ADAPTATION

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1. CONTENTS

2. ABBREVIATIONS

Acronyms	Definitions
ASA	Agricultural Seed Agency
CGIAR	Consultative Group on International Agricultural Research
DCAS	Digital climate advisory services
DLI	Disbursement-Linked Indicator
FDG	Focus Group Discussion
GCA	Global Center on Adaptation
IFAD	The International Fund for Agricultural Development
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
MoA	Ministry of Agriculture
TARI	Tanzania Agricultural Research Institute
T-FSRP	Tanzania – Food System Resilience Program
ToR	Terms of Reference
TOSCI	Tanzania Official Seed Certification Institute
TYEGD	Tanzania Youth Espouse for Gender and Development
VC	Value Chain
WI	Weather Impact

3. EXECUTIVE SUMMARY

This report provides a comprehensive assessment of Tanzania's M-Kilimo e-extension platform, with a focus on its potential to deliver Digital Climate Advisory Services (DCAS) to smallholder farmers. Commissioned to support the Ministry of Agriculture (MoA) in achieving the goals of the **Tanzania Food Systems Resilience Program (T-FSRP),** the analysis identifies critical gaps and presents an actionable roadmap for creating a financially sustainable, scalable, and impactful service.

Background

Agriculture, the backbone of Tanzania's economy, is highly vulnerable to climate change, with disruptions in rainfall and increased extreme weather events threatening the livelihoods of millions of smallholder farmers. While the T-FSRP rightly prioritizes the expansion of M-Kilimo to include five new services, including vital weather and climate information, this assessment reveals critical gaps. The platform's ICT backbone development is behind schedule according to the T-FSRP target's timeline, farmer awareness is critically low, usage basically inexistent given that the platform is not operational, and governance and financial sustainability models are not yet defined. Without addressing these issues, there is a significant risk that substantial investment will not lead to widespread adoption or long-term impact.

Assessment Methodology

The findings and recommendations of this report originate from a mixed-methods approach designed to capture multi-stakeholder perspectives and on-the-ground realities. The methodology consisted of three pillars:

1. **Stakeholder Engagement:** Extensive consultations were held with over a dozen key informants from government (MoA, TMA), development partners (FAO, WFP), NGOs, and the private sector. These semi-structured interviews provided insights into institutional dynamics, partnership challenges, and strategic vision.
2. **Field Data Collection:** A survey of 250 farmers across five regions (Arusha, Mara, Dodoma, Mbeya, and Songwe) was conducted, complemented by Focus Group Discussions. This primary data quantified awareness levels, information sources, needs, and willingness-to-pay, providing a crucial reality check against official assumptions.
3. **Comparative Landscape Analysis:** A review of over 15 existing DCAS and e-extension initiatives in Tanzania (e.g., Ugani Kiganjani, Kilimo BaNDO, Kilimo Thabiti) was performed. This analysis identified lessons learned, successful practices, and common pitfalls related to technology, dissemination, business models, and scalability.

The assessment framework was structured around six key requirements for sustainable DCAS, adapted from Global Center on Adaptation (GCA) principles: ICT Infrastructure, Dissemination & Uptake, Accountability & Governance, Financial Sustainability, Scalability, and Equity.

Central Findings from the Assessment

The evaluation of M-Kilimo and other DCAS initiatives in Tanzania yields four central findings. Firstly, a fully functioning platform is not yet in place. While a farmer database exists and a mobile app is in development, the core services, particularly weather information from the Tanzania Meteorological Agency (TMA), are not yet integrated or operational for end-users.

Secondly, user uptake presents the primary bottleneck. In the best case, M-Kilimo might be a known name to some farmers, but they are not aware of the new M-Kilimo platform, how to use it and what are its benefit. Furthermore, the high extension officer-to-farmer ratio of 1:682 creates a systemic bottleneck for a service reliant on one-on-one queries.

Thirdly, the issue of financial sustainability remains unaddressed. The current model, reliant on government and donor funding, is not sustainable. Our cost analysis shows that scaling USSD and SMS to millions of farmers would be prohibitively expensive, and a direct Business-to-Consumer (B2C) model where farmers pay for services is unlikely to succeed.

Finally, governance and partnerships require significant strengthening. Decision-making processes are slow, and partnerships with key stakeholders such as the FAO and the private sector have been hampered by institutional transitions and a lack of transparency, which hinders collaboration and innovation.

Pathway to Sustainability

The report concludes that the only viable path forward is for M-Kilimo to adopt a Business-to-Government-to-Consumer (B2G2C) hybrid model. This approach strategically leverages public resources to create a core public good—a verified national farmer registry and basic advisory platform—which then generates revenue from the private sector to ensure long-term financial independence.

The model is built on a multi-layered revenue strategy:

- **Tier 1: Public Good Funding:** Government and donors fund the essential infrastructure: the farmer database, core platform maintenance, and basic weather alerts.
- **Tier 2: Commercial Bundling (B2B2C):** M-Kilimo charges agribusinesses (e.g., seed companies, insurers, banks) a fee to bundle their products (loans, insurance, inputs) with targeted climate advisories and distribute them through the platform to farmers.
- **Tier 3: Data Monetization:** The MoA brokers aggregated, anonymized insights from the platform—such as yield predictions or pest outbreak patterns—to financial institutions and commodity buyers, creating a high-margin revenue stream.
- **Tier 4: Climate Finance:** M-Kilimo can position itself as the national digital platform for Monitoring, Reporting, and Verification (MRV) of agricultural carbon credit projects, tapping into the growing voluntary carbon market.
- **Tier 5: Data as Collateral (Future):** In the longer term, verified farmer data (e.g., yield history, practice records) could be used as digital collateral to unlock access to larger, lower-cost credit, with enforcement via digital mechanisms rather than physical assets.

Critical Recommendations for Immediate Action

To achieve T-FSRP targets and build a sustainable system, the MoA must focus on a few critical actions in the short term:

1. **Finalize and Launch the Core Service:** Prioritize the full, automated integration of TMA's weather data into the M-Kilimo app. Deliver localized, timely forecasts and basic early warnings. This is the essential first step to demonstrate utility and build farmer trust.
2. **Launch a Multi-Channel Awareness Campaign:** Actively promote M-Kilimo through radio, targeted SMS blasts, and the extension officer network. Marketing is not optional; it is fundamental to driving farmer uptake and meeting the T-FSRP targets on user numbers.
3. **Formalize the Hybrid Business Model:** Establish a clear governance and legal framework for Public-Private Engagement (PPE). Begin piloting bundled service agreements with agribusiness partners to validate the B2B2C revenue stream.
4. **Strengthen Governance and Operational Structure:** Define clear roles and responsibilities within the MoA and with partners like TMA. Move towards a more structured, accountable management model for the platform to accelerate decision-making and foster effective collaboration.

Governance and Operational Recommendations

To execute this roadmap, M-Kilimo must transition from a "project" to a **professional Agritech Entity** structure within the government.

1. **Leadership**: Appoint a **Programme Director/CEO** with specific experience in Agritech/Fintech, not just general administration.
2. **Specialized Departments:**
    - **Engineering:** Dedicated to API uptime, app stability, and security.
    - **Product:** Focused on UI/UX and translating farmer needs into features.
    - **Business Development:** Solely focused on securing B2B partnerships (Banks, Insurers).

- **Support:** Managing the AEO network and helpdesk.

3. **Policy Pivot:**
    - **Abandon the "Uber-Model" Operator Role:** The MoA should not run a ride-hailing style service for AEOs. Instead, act as the **regulator**, certifying AEOs and allowing private companies to build the booking logistics.
    - **Cost Reduction:** Negotiate "Cluster User Group" rates or zero-rating for agricultural data/USSD with TCRA and MNOs.

Addressing Cross-Cutting Challenges

The development of M-Kilimo must consciously address key trade-offs:

- **Inclusivity vs. Cost:** While digital tools are efficient, reliance on smartphones risks excluding many. A multi-channel strategy incorporating USSD, radio, and call centers is essential for equity.
- **Automation vs. Local Relevance:** Automated, location-specific weather delivery is necessary for scale. However, combining this with localized capacity building for AEOs and farmers ensures advice remains contextually relevant and trusted.
- **Public Mandate vs. Private Innovation:** The MoA should provide oversight and core public infrastructure but actively leverage private-sector innovation for service delivery, technical development, and market linkages, rather than building everything from scratch.

Contributing to National Goals: Job Preservation and Creation

A successful M-Kilimo directly supports Tanzania's broader development agenda:

- **Job Preservation:** By providing climate advisories and facilitating access to climate-smart inputs and financing, M-Kilimo helps protect millions of existing farming livelihoods from climate shocks.
- **Job Creation:** The platform fosters new employment in the digital economy, including roles in agri-fintech, data analysis, renewable energy services, and as Village Digital Agents (VIDAs). By enabling an "Uber-model" for certified private extension services and positioning Tanzania in the carbon markets, it creates entrepreneurial and "green job" opportunities.

Conclusion

By implementing this roadmap, the MoA can transform M-Kilimo from a project-in-development into a powerful, sustainable national asset that empowers Tanzanian farmers with the climate information they need to build resilience, increase productivity, and secure their livelihoods for the future. However, achieving the T-FSRP goals requires an immediate pivot from a donor-funded project to a commercially viable, professionally managed B2G2C ecosystem. Failure to make this structural shift will likely result in a platform that is technically functional but financially unsustainable and largely unused

4. INTRODUCTION

4.1 Agrifood Sector in Tanzania

Agriculture is central to Tanzania's economy and a key driver for rural poverty reduction. The sector employs around 80% of the population, largely composed of smallholder farmers dependent on rainfed agriculture. These farmers supply 95% of the country's food needs. Tanzania is among East Africa's leading food crop producers, with agriculture making a significant contribution to GDP. Despite this, the sector faces persistent challenges: low productivity, limited access to modern inputs and technologies, poor infrastructure, and increasing climate risks (World Bank, 2017; 2019). Adaptation strategies for smallholder farmers include access to improved seeds, modern technologies, and better extension services (Gwambene et al., 2023).

4.2 Climate Change in Tanzania's Agrifood Sector

Tanzania's climate is shaped by the Inter-Tropical Convergence Zone (ITCZ), bringing short rains (Oct–Dec) and long rains (Mar–May) (IIED, 2023). The country's equatorial location results in high year-round temperatures. Climate change has disrupted weather patterns, with rising temperatures, more hot days (>35°C), increased evaporation, and intensified droughts and floods (GIZ, 2021; World Bank, 2021).

These climate shifts threaten agriculture. Studies suggest that by 2050, a 2°C temperature increase (compared to pre-industrial time) could reduce maize yields by 13%, with pest pressure contributing to further losses (Mafie, 2021; Irish & Volk, 2023). The African fall armyworm, for instance, thrives in warmer climates (Huang et al., 2021). Moreover, rainfed crops are particularly vulnerable to the changing climate (Gwambene et al., 2023).

Recent events illustrate these risks: severe droughts in 2023 impacted up to 70% of cropland in northeastern Tanzania (Tanga, Kilimanjaro, Arusha, Pwani), leading to major crop losses (FAO, 2023). In some areas with a single rain peak (unimodal rainfall regime), delayed rains caused poor harvests, worsened by pests and high fertilizer costs linked to global conflicts. Later in 2023, El Niño-induced floods affected 76,700 hectares of farmland and displaced over 10,000 households (ReliefWeb, 2024).

Adaptation strategies focus on resilient seeds and technologies. Digital agriculture plays a crucial role in supporting these strategies by improving farmers' access to timely climate information, extension services, and market linkages. Digital tools enhance adaptive capacity by enabling informed decision-making and increasing the efficiency of input use, which is essential for building resilience to climate change (Kitole et al., 2024).

Addressing climate change and guiding adaptation strategies requires a strong and coordinated policy framework. Tanzania's policy framework includes the National Climate Change Response Strategy (NCCRS 2021–2026), Agricultural Sector Development Programme Phase II (ASDP II, 2017–2028), and the Agricultural Master Plan (AMP, under development). The NCCRS outlines national climate priorities, ASDP II translates these into sectoral action, and the AMP sets a long-term transformation agenda (URT, 2017; 2021; 2023). Moreover, the Nationally Determined Contribution (NDC, 2021) document outlines adaptation targets for 2030, mentioning the use of climate services, climate smart interventions, early warning system and weather forecasting dissemination. However, all these documents inadequately address digital climate adaptation services. Digital tools remain underdeveloped, limiting smallholder access to adaptation support.

4.3 The Tanzania Food Systems Resilience Program (T-FSRP)

To help fill these gaps and strengthen climate adaptation on the ground, the Tanzania Food Resilience Program (T-FSRP) had been introduced, that integrates digital and climate-resilient approaches. The T-FSRP is a $300 million World Bank-financed initiative supporting climate-resilient food systems. It complements ASDP II through investments in different result areas (RA):

- RA1: Strengthening research, extension, and seed systems.
- RA2: Enhancing climate-resilient infrastructure.

- RA3: Improving fiscal performance to support priority investments.

Funded through a blend of Program for Results (PforR) and Investment Project Financing (IPF), progress of the results areas is measured through Disbursement Linked Indicators (DLIs). RA1 DLIs include:

- DLI1: Sustainable funding for climate-resilient technologies
- DLI2: Expanded extension outreach, including digital solutions
- DLI3: Improved seed value chain linkages

DLI2 is dedicated to strengthening the outreach of e-extension, through ICT solutions for promoting climate-smart practice. Concretely, this means expanding the current platform of the Ministry of Agriculture (MoA): Mobile-Kilimo (M-Kilimo). The following goals for the platform have been set, linked to DLI2.

- DLI 2.1: Rollout of 5 new service functionalities on M-Kilimo by FY 2024/25.
- DLI 2.2: Training of 1,500 EOs (30% women) in FY 2024/25 and 2,500 in FY 2025/26, toward a total of 4,000 trained.
- DLI 2.3: Reaching 500,000 farmers (30% women) by FY 2025/26, and 1.5 million in total with e-extension services.

DLI2.1 focuses on development and implementation of new services. Within the PforR, five services were identified:

1. Seasonal production and GAP
2. Digital recognition for pest
3. Early warning of pest and disease
4. Weather information
5. Market price trends and market opportunities

Deducing from the DLI's and the planned development of services, the MoA aims to fill the gap of missing climate and weather information in M-Kilimo by developing the new services.

The T-FSRP is a five-year program that began in May 2023. As of July 2025, the program is two years into implementation. In consultation with the MoA, the status of DLI2 has been reviewed. To support the roll out of 5 new services, the MoA is developing a mobile application as part of M-Kilimo, intended to host these services and connect users with relevant information.

Despite these set goals, there's limited clarity on how these digital climate services will gain shape within M-Kilimo, and how these investments will be sustained in the long term. Additionally, the program does not address equal access to the services.

The '*Technical Support for Strengthening Digital Climate-Informed Advisory Services and Scaling Climate-Resilient Seeds'* project aims to support the Ministry of Agriculture in achieving T-FSRP RA1 targets. This work will contribute to sustainable digital climate advisory services. This will be done by assessing M-Kilimo. Based on this assessment, room for improvements will be identified. Parallel to the assessment of M-Kilimo, other services will be identified and studied. Based on the lessons learned from these services, and the identified gaps of M-Kilimo, the report will conclude will recommendations in the final chapter.

5. METHODS

This study focuses on M-Kilimo and other existing digital climate-informed advisory services (e-extension platforms) that assist smallholder farmers in climate change adaptation. M-Kilimo intends to broaden its service offerings, including integrating weather forecasts, and extend its reach to more farmers. This aligns with the DLIs set within the T-FSRP. Within this study, we focus on M-Kilimo, its status, and investigating how the Ministry of Agriculture (MoA) can achieve the expansion goals.

Leveraging the consortium's extensive experience in DCAS, particularly through the Kilimo Thabiti project, our focus will be on supporting the following critical aspects:

- Integrating new services into M-Kilimo (DLI2.1), specifically:
    - Enhanced climate and weather information.
- Increasing the overall number of farmers engaged by M-Kilimo (DLI2.3).
- *Formulating recommendations for capacity building (DLI2.2).*

To effectively assist the MoA in attaining these DLIs, our work has been broadly structured into four phases: (1) an inception phase, where scope and project plan have been discussed with relevant parties and engagements have been established with relevant stakeholders, (2) creating a short initial overview of current landscape (3). An assessment designed to reflect on the current strengths and weaknesses of M-Kilimo and other initiatives, and (4) investigate specific areas for improvement for M-Kilimo and initiatives. To assess this, the work has been structured into key requirements that form the foundation for a sustainable DCAS service. These key requirements are based on the work of Ferdinand, T. et all. (2021) for the Global Center on Adaptation (GCA):

- Data quality and assurance
- Equity
- Co-creation
- Accountability and governance
- Financial sustainability
- Scalability

Financial sustainability will be assessed in separate chapters because of its great importance. Chapter 10 elaborates further on the requirements.

In conducting the assessment, three different methods are used to gather information: (1) Literature review, (2) Stakeholder engagement, (3) Field data collection

Stakeholder engagement involves interacting with all relevant actors in the sector, including individuals and organizations operating at the national, regional, and local levels. This was undertaken by organizing an inception workshop to start initial engagement and follow-up engagement with relevant key-informants through semi-structured interviews and e-mail contact. A full list of interviews is available in Annex 3.

Field data collection focuses on gathering insights directly from farmers and Agricultural Extension Officers in their local contexts. A field survey was conducted in five regions of Tanzania: Arusha, Mara, Dodoma, Mbeya, and Songwe (Fig. 3). One district was selected from each region—Babati (Arusha), Butiama (Mara), Kongwa (Dodoma), Mbeya DC (Mbeya), and Mbalizi (Songwe). The survey has been performed in synergy with a study on climate-resilient seeds. Therefore, the study focuses on farmers cultivating three key crops in four different regions: common beans in Arusha, cassava in Mara, and maize in Mbeya, Songwe, and Dodoma. These crops were selected for their crucial role in ensuring food and nutritional security, as well as their significance as a source of income for smallholder farmers. Data were collected using farmer questionnaires, focus group discussions (FGDs), A total of 250 farmers (50 from each region) were interviewed.

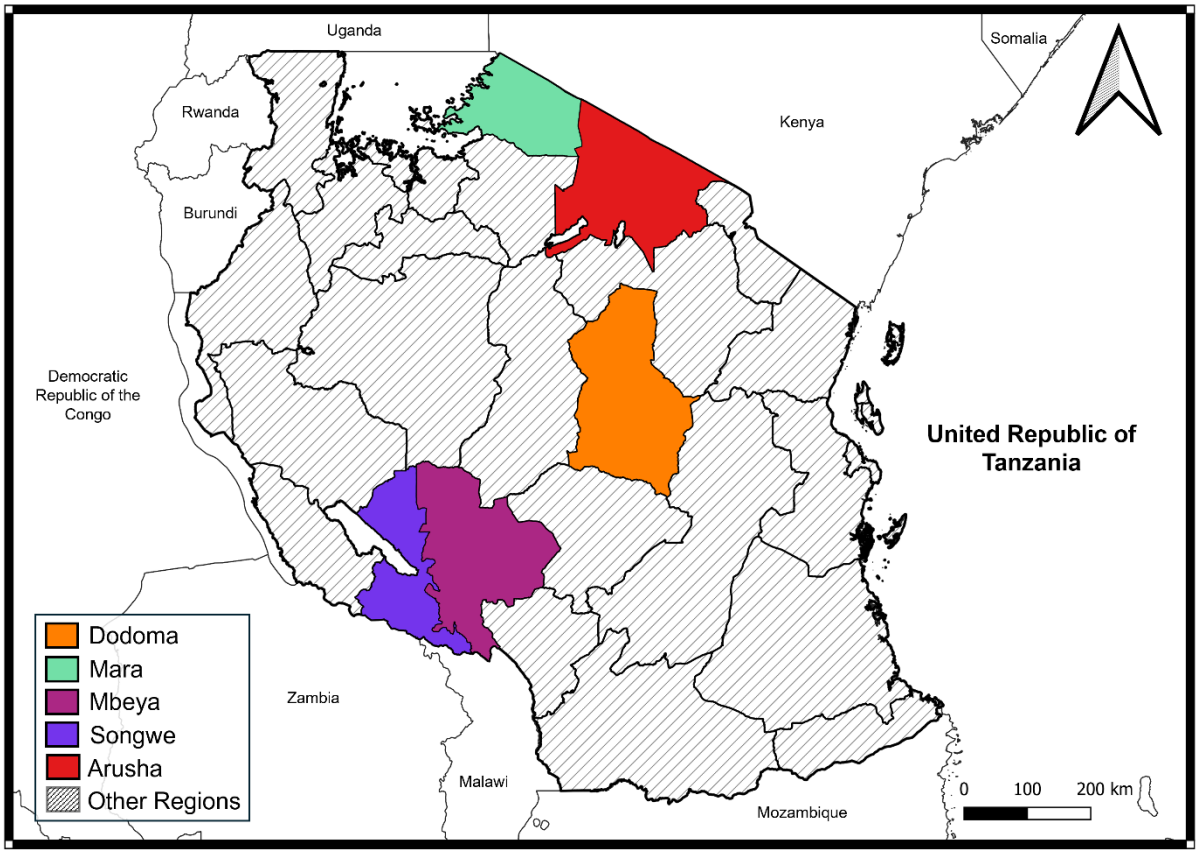

Figure 1. Project focus regions within Tanzania. Source: Weather Impact 2025, UN OCHA database.

6. INTRODUCTION TO DCAS AND M-KILIMO

6.1 Description of Current Landscape

To adapt to the changing climate, it is essential that farmers are well informed. E-extension (short for electronic extension) refers to the use of digital technologies—such as mobile phones, websites, apps, SMS, radio, or other ICT tools—to deliver agricultural advisory and extension services to farmers and rural communities. The current landscape of e-extension services in Tanzania is quite extensive. Services vary widely in scope and focus. Some are designed to reach a broad audience, covering multiple topics but offering more general information as a result. Others target specific users and issues, delivering tailored insights that are often less scalable but more relevant to their intended audience. Tanzania hosts a growing number of e-extension services, but most are still in early stages or not fully aligned with the realities of smallholder farmers.

Most services can be categorized as follows:

- Governmental e-extension services, providing agricultural information and extension support.
- Various NGO-based initiatives for piloting or supporting services
- Private sector based (commercial) services

Most platforms focus on digital procurement, agri-eCommerce or financial services, linking farmers to in- and output markets. Most popular delivery channel for e-extension is delivery via SMS or USSD, due to the widespread use of feature phones. Data from the International Telecommunication Union (ITU) indicates that only 31.9% of Tanzanians are online and according to the TCRA statistics for the quarter ending June 2025, smartphone penetration was 36.75%.

Neglected within the e-extension services are the dissemination of weather and climate information to the agricultural sector. Less than 5% of farmers reported receiving climate-related information (Kilimo Trust, 2023), yet most farmers are greatly interested in receiving the weather forecast. This was indicated by the data field collection, where almost 95% of the farmers indicate they need more and regular weather forecast. In addition, Esoko analyzed farmers' requests, identifies weather forecast as the most requested information, giving an indication of farmer's needs.

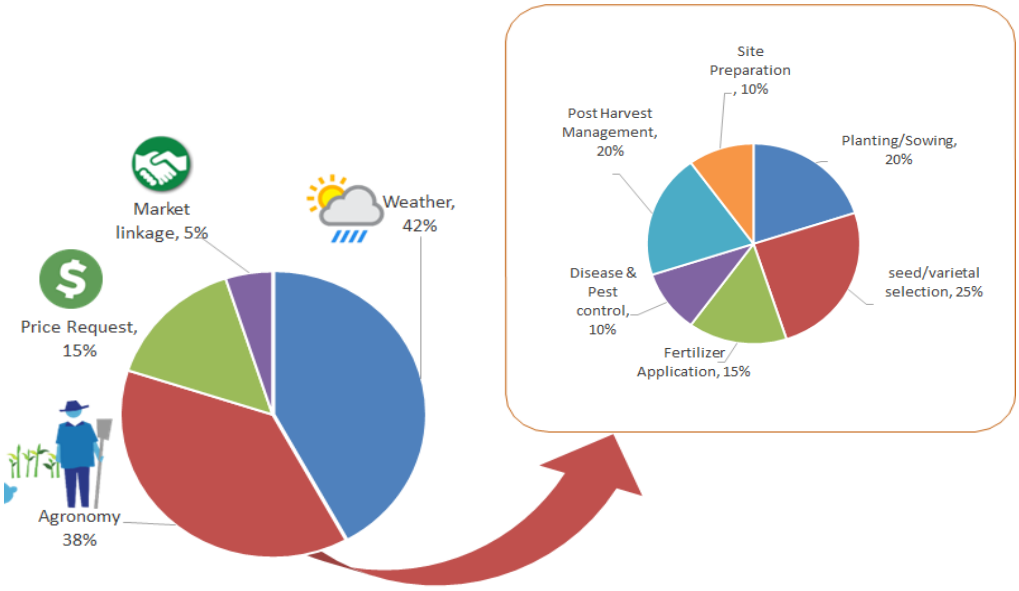

Figure 2. Farmers need based on their information requests (Esoko, farmer helpline call center data analysis, 2023)

Even though only 5% of the farmers receive weather or climate information, there are still multiple initiatives that are active in this field. Important stakeholder in Tanzania on DCAS is the Tanzanian Meteorological Agency (TMA). TMA is the national agency responsible for weather, climate, and atmospheric services in Tanzania. It is a government institution established by law, giving it the official mandate to observe, collect, analyze, and disseminate meteorological and climate information. In annex 2, an overview is given of all ongoing efforts from TMA to disseminate weather information.

Even though TMA has the mandate in disseminating weather information, there are many other initiatives active in Tanzania, sometimes in collaboration with TMA. These initiatives are often focused on specific regions or value chains, or specific users. In the table below an overview is given of some initiatives (Climate Information Services-Community of Practices in Tanzania, 2025).

Umbrella terms often used for weather and climate information services are CIS (Climate Information Services) and DCAS (Digital Climate Advisory Services). For consistency, in this report the term DCAS will mainly be used.

Table 1. DCAS initiatives in Tanzania

Initiative	Lead	Activity description	Dissemination channels	Users	Partners	Areas of activity	Weather/Climate data used	Active?
M-Kilimo	MoA	Disseminate weather forecast and other agricultural advisories	USSD, phones calls, mobile app, extension officers	Extension officers, farmers	TMA	Nationwide	TMA	Yes
Seasonal & Special Bulletins, Dekadal Agromet Products, FarmSMS, National Early Warning/EW4All	TMA	Seasonal & dekadal forecasts, SMS alerts, early warnings, trainings, exhibitions, workshops	National TV & radio, newspapers, TMA website, email/PDFs, SMS, fairs, workshops	Farmers, policymakers, researchers, extension officers, cooperatives, general public	Government ministries (Agriculture, Water, Disaster Mgmt.), FAO, WMO, NGOs (CCAFS, FAO)	Nationwide (pilots for FarmSMS: Coast, Morogoro: Morogoro, Mbeya, Dodoma)	TMA forecast	Yes
CIS & Early Warning for Drought	WFP	Dissemination of climate-informed advisories, early warning for drought, anticipatory actions	Community meetings, SMS, local gov. briefings	Farmers, communities	Local Government Authorities	Handeni, Kiteto, Kondoa, Longido, Meatu, Micheweni, Mkalama, Monduli, Same, Simanjiro	TMA forecasts, satellite rainfall estimates	Yes
Ugani Kiganjani	FAO	Advisory services, crop/livestock guidance, Weather forecast dissemination	Mobile app, web portal	Farmers, livestock keepers, extension officers	TMA, local governments, telecom providers	Nationwide	TMA forecasts	Yes
Inclusive Rice Value Chain project	Norges Vel	Training on access and use of weather/climate information services	Training sessions, workshops	Extension officers, farmers	Local Agriculture Offices	Barali, Mlimba, Malinyi (Morogoro), Mbeya Region	TMA forecast	Yes

Integration of Scientific Forecasts & Indigenous Knowledge	CAN	Integration of scientific forecasts with indigenous knowledge, dissemination of downscaled climate info	Workshops, community meetings, SMS	Farmers, local communities	Local authorities, NGOs	Chalinze DC, Bagamoyo DC, Pangani DC, Lushoto DC	TMA forecasts, IK (Indigenous Knowledge)	Yes
DARAJA PROJECT	CCI	Dissemination of CIS (among other activities)	Radio, TV , SMS, Word of Mouth	Vulnerable urban communities	TMA, UK Met Office, and Resurgence	Dar es Salaam	TMA forecasts	Yes
Early Action Protocol (EAP)	TRCS	Dissemination of early warnings, anticipatory action for floods	Community meetings, SMS alerts, radio	Flood-affected communities	TMA, Disaster Management Department	Nationwide flood-prone areas	TMA forecasts	Yes
Kilimo Thabiti	Weather Impact	Weather forecast dissemination, agricultural advisory	SMS	Smallholder farmers	TARI, local offices	Mara Region	ECMWF. TMA	No
Farm Radio International (FRI) – Interactive Climate & Agri Programs	FRI	Radio programs, gender-responsive interactive climate/agri advisories	Radio programs, SMS/cell phones	Farmers, pastoralists	Local radio stations, NGOs	Kongwa, Chamwino, Singida, Ikungi, Karatu, Meru, Hai, Same, Lushoto	TMA forecasts	Yes
CRAFT	SNV	Weather information service (among other activities)	SMS to lead farmers, WhatsApp groups	Smallholder farmers	Local extension officers, finance partners, TMA	Singida, Manyara, Dodoma, Rukwa, Songwe	TMA forecasts	No
Kilimo Bando	Bizy tech	Actionable advice based on weather forecast	USSD, mobile app, web portal	Smallholder farmers	TCB Bank	Nationwide	TMA forecasts	Yes
UPTAKE project	Esoko Tanzania	Agronomic advisory, weather information, pest and disease alerts, Video training APP – e-learning, inputs linkage, digital data collection and management, Geospatial mapping	SMS, Videos	Extension officers, farmers	CABI, FRI	Iinga, Rukwa, Ruvuma, Njombe and Mbeya	aWhere, NOAA, TMA forecasts	No

Esoko Tanzania information services	Esoko Tanzania	Agronomic advisory, weather information, pest and disease alerts market linkage, Video training APP – e-learning, inputs linkage, digital data collection and management, Geospatial mapping and real-time dashboards	SMS, IVR, USSD, Video, SMS keywords, Web dashboards	Extension officers, farmers, researchers, cooperatives, general public	Esoko Ghana	Nationwide	aWhere, NOAA, TMA forecasts	Yes
Kigoma Joint Project I & II	NCA, Esoko	Micro drip irrigation systems, Agronomic advisory, weather information, market linkage, Video training APP – e-learning, inputs linkage, digital data collection and management, Geospatial mapping	SMS, USSD, Video, Web dashboards	Extension officers, farmers	UNCDF, NCA, CARITAS	Kigoma	aWhere, NOAA, TMA forecasts	Yes

6.2 M-Kilimo

6.2.1 M-Kilimo System

M-Kilimo is a government-supported digital platform in Tanzania specifically designed to provide agricultural advisory services to farmers. This platform, which improves communication between Agricultural Extension Officers (AEOs) and farmers in rural areas through USSD and a web-based interface, is a core component of a larger digital initiative (Kilimo Trust, 2023). E-Kilimo is the broader, overarching system. Unlike M-Kilimo, which is focused solely on extension services, E-Kilimo is a comprehensive platform built to assist the MoA by integrating various government e-services. This includes connecting to national databases, banking systems, and other platforms. Therefore, M-Kilimo is not a standalone initiative but rather a key module within the larger E-Kilimo framework, alongside other systems for services such as fertilizer registration. The MoA received initial support from FAO to set up a call center for M-Kilimo, which was launched in 2020.

Kilimo Trust (2023) reports that M-Kilimo is relatively widely used and trusted by farmers, although their results are challenged by a small sample size of data collected for this study, reported in Chapter 7.1.2). Leveraging the stable reputation of the platform, the government has been advised, and is already executing, to extend the use of M-Kilimo for this reason. This is envisioned by not only maturing as a digital platform and changing functionalities, but also by extending into different services as explained in the introduction. One of the recommendations from previous studies (Kilimo Trust, 2023) is extending to integration of weather and climate information from TMA in M-Kilimo.

7. GAP ASSESSMENT OF CURRENT E-EXTENSION PLATFORMS

Given farmers' growing need for reliable weather information, the existence of various DCAS initiatives already providing such services, and the commitment of M-Kilimo within the T-FSRP to deliver weather data, this report focuses on strengthening and extending weather information provision to farmers through the M-Kilimo platform. Successful implementation and scaling of DCAS rely on multiple interlinked principles that ensure effectiveness and sustainability. Based on the experience of numerous initiatives, the GCA (2021) developed a blueprint to evaluate existing initiatives. Based on experience of experts, nine challenges were defined, that often hampered the effectiveness or sustainability of a service. Out of these nine challenges, six requirements were defined:

- Data quality and assurance. This involves quality, accuracy and validation of data and data governance.
- Equity, with services designed to be inclusive of marginalized and vulnerable groups, such as women, youth, and persons with disabilities. This also involves access to digital tools for users.
- Co-creation strengthens service design through participatory approaches that involve end users directly, fostering trust, ownership, and relevance.
- Accountability and governance (transparent), are also essential, including defined governance structures, monitoring, and reporting to maintain credibility.
- Financial sustainability, supported by viable business models and service bundles that go beyond reliance on donor funding.
- Scalability with deliberate strategies to expand services from pilot initiatives to regional or national levels through partnerships, regulation, and infrastructure integration.

Within this study, different initiatives are assessed by evaluating them against these requirements. The requirements were adapted in this study to focus more on DCAS development than improvement. Most importantly in these changes, is narrowing of the requirement of data quality and assurance. Related to this topic, the assessment mainly focuses on ICT infrastructure, data flows and data governance, and less on data quality. This is because verifying data quality is a difficult task, which alone would take more resources than the one available to conduct this study and to compile this report. On top of that, our analysis shows that there are enough pending challenges on the ICT infrastructure and data flows preventing any data delivery, making the data quality an important, but not urgent topic of research. Therefore, this requirement is renamed and summarized to 'ICT'. Table 2 shows an overview of the rephrased requirements:

Table 2 - DCAS requirements

Requirements from Blueprint	Explanation	New requirements
Data quality and assurance	Focusses only on data infrastructure, data flows and data governance	ICT
Equity	Equity and co-creation are combined and rephrased	Dissemination and uptake
Co-creation		
Accountability and governance	-	Accountability and governance
Financial sustainability	-	Financial sustainability
Scalability	-	Scalability

M-Kilimo and other initiative will be evaluated in this chapter by discussing these requirements expect financial sustainability which will be discussed separately in Chapter 8.

7.1 Strengths and gaps of M-Kilimo related to weather and climate information

7.1.1 ICT

Overall system

As explained in chapter 5, M-Kilimo is a module within E-Kilimo, and M-Kilimo is the module supporting extension in the MoA in Tanzania. In the following infographic (Figure 3) the information flow is explained, focusing on weather information data.

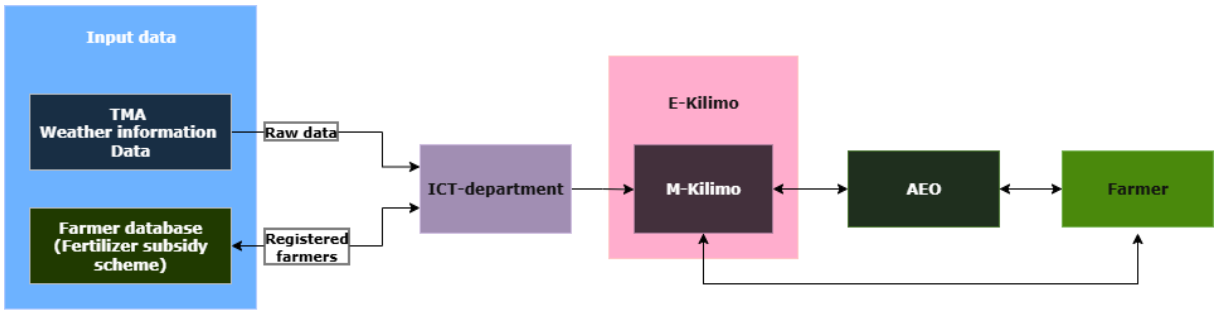

Figure 3. Overview of information flow related to climate and weather data in around M-Kilimo

The extension module of M-Kilimo currently utilizes multiple communication channels. For some time, it has primarily relied on the following two channels:

- A call center that farmers can call to pose their queries by giving the center a phone call.
- A USSD system that farmers can use to pose their queries. Farmers access M-Kilimo through a USSD channel, allowing them to submit queries directly from their mobile phones without needing internet access. The query system is structured across multiple administrative levels—from the MoA down to regional, district, ward, and village levels. When a farmer submits a query, it is first directed to the AEO at the village or ward level. If the query is not answered within 24 hours, it is automatically escalated to the next level up. Once a query is submitted, the assigned AEO receives an SMS notification alerting them that a new question has arrived. To respond, the AEO must log into the M-Kilimo system, where they can access the full history of the conversation with the farmer. This ensures continuity and context in communication. The AEO then replies to the farmer through the system, and the response is delivered back to the farmer via USSD

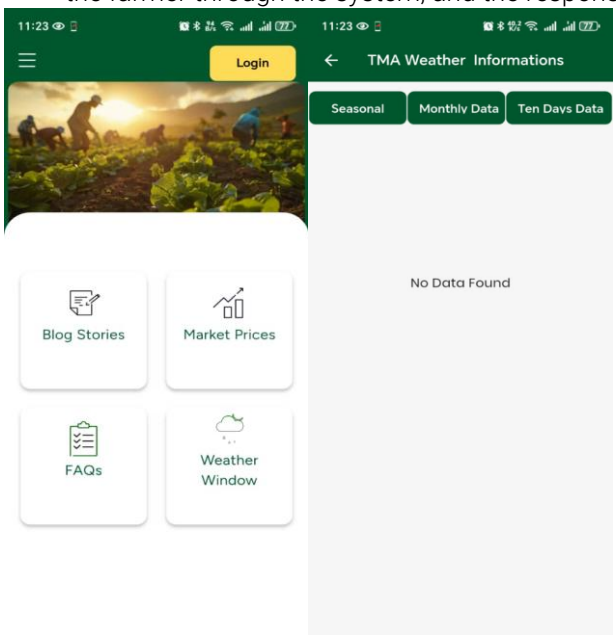

Figure 4. Screenshot op M-Kilimo app (September 2025)

Recently the MoA has taken steps to communication by maturing in digitalization. Within this exercise, the M-Kilimo platform is complemented by developing an app. The app is designed to contain multiple services, including weather forecast, and serves therefore as a platform. Extension officers and farmers who own a smartphone can access the app and receive instantly information. The app is currently under development, but release of the first version is aim on short notice.

The status of the app is shown in the accompanying Figure 4. While the basic framework has been developed and can be accessed, the app remains largely a mock-up at this stage. The interface is functional; however, it lacks content. Although a button has been established to integrate weather information, this component is also currently lacking data.

Dataflow and data products

Beyond the clear data products, if it is through USSD or through the app, an operational M-Kilimo requires a clear and functional data flow to deliver content, particularly weather and climate information, to farmers. The first step in this process is the sharing of data from TMA to the MoA, which was previously a bottleneck. As of July 2025, the MoU enabling data sharing between TMA and the MoA has been signed. The MoA has indicated that the data sharing arrangement between TMA and M-Kilimo is now in place, however, not yet launched to the production environment. The MoA has indicated that they aim to provide farmers with four main weather products: (1) daily weather forecasts, (2) 10-day forecasts, (3) monthly outlooks, and (4) seasonal outlooks. Currently it is set-up in a way that TMA will deliver daily raw data via an API, while seasonal forecasts will be exchanged through bulletins. This means that the MoA's extension department will interpret raw weather data and translate it into actionable advice for farmers, tailored to districts or wards. It is not yet fully determined whether this translation will be centralized at the extension office or handled by individual AEOs, nor is the visualization of this information in the app fully defined. These points indicate that while the technical ICT backbone is in place and the MoU has cleared the initial institutional bottleneck, operational workflows and data products are still under development.

Farmers registration

An essential component of the M-Kilimo system is the registration of farmers to enable access to services through USSD, SMS, and the upcoming smartphone app. As of September 2025, approximately 4.45 million farmers are registered in M-Kilimo. This dataset is based primarily on the Tanzania Fertilizer Subsidy Program and replaces earlier datasets of over 7 million farmers, which were found to have data quality issues, including the absence of unique farmer identifiers. Efforts are underway to create a centralized, clean database by consolidating the registered farmers from the Fertilizer Subsidy Program with other MoA farmer datasets. This unification is an important first step for implementing M-Kilimo, as it ensures that each farmer can be uniquely identified. It must be mentioned that 4.45 million users are said to be registered. However, it is not clear if those farmers are aware of that, or make use of M-Kilimo, since this number originates from the Fertilizer Subsidy Program.

Currently, farmers cannot yet self-register in the M-Kilimo app due to technical and administrative considerations, although future aim is to enable self-registration. Some farmers are expected to be provided with smartphones by the MoA to facilitate access to the app and other digital services. In the meantime, farmers can interact with M-Kilimo primarily through USSD and SMS. The MoA is planning to continuously monitor and update the registration process to accommodate new users and ensure data integrity as the system scales.

Data Quality

The weather and climate data used in M-Kilimo originates, as mentioned, from TMA. The quality of weather data provided by TMA is generally considered reliable and robust. TMA is the official national meteorological service of Tanzania and is a member of the World Meteorological Organization (WMO). As a WMO member, TMA adheres to international standards and guidelines for meteorological data collection, processing, and dissemination. This affiliation ensures that the data meets recognized quality benchmarks. Furthermore, TMA's Client Service Charter emphasizes the agency's commitment to providing quality, reliable, and timely meteorological services to stakeholders (Website TMA, WMO). Therefore, the quality of the weather forecast will be considered outside the scope of the report.

However, for the M-Kilimo platform to effectively serve farmers, it is important that the data provided is not only accurate but also localized, timely, and tailored to the specific needs of the users. The information gathered suggests that the weather service provided by TMA will be at district level, despite this is difficult to verify as the service is not yet available at the time of writing. Ensuring that weather information is relevant to the local context and delivered promptly is essential for the platform's success in supporting agricultural decision-making and is also related to quality. If the weather information needs to be combined with farming advice, reaching a village-level localization (already available for all major global weather models) of the weather information would substantially improve the quality of the service, especially in regions with not a uniform terrain (like coastal, lake and mountain areas).

It must be noted that, besides this, weather forecasts are never 100% accurate, which is why they are often expressed in terms of probabilities. Ensuring data quality therefore also means helping users understand this principle. This requires building their capacity to interpret and apply probabilistic forecasts effectively.

At present, it remains unclear how data is communicated to farmers as there are no advisories issued regularly, whether it is understandable, presented in text or visual form, and whether it is delivered in a timely and localized manner.

Security and data privacy

The M-Kilimo system has measures in place to protect farmers data, although some details remain limited. Tasks are separated so that staff can only access the data relevant to their responsibilities, and a small, dedicated security team is being trained in data governance and e-governance standards. As of September 2025, the team consists of two trained security staff, with plans to expand training for additional personnel. Further details on system compliance with national data protection regulations or protocols for private-sector data sharing are not yet available, indicating that more information is needed to fully assess data privacy and security practices.

Maintenance and Support

The M-Kilimo system has a development and production pipeline in place, which allows updates and bug fixes to be managed systematically. However, specific procedures for ongoing system maintenance, handling technical issues, and providing support to both farmers and extension officers are not clarified in the available information. In personal communication, it is indicated that the ICT team needs more capacity on this topic.

7.1.2 Dissemination and Uptake

The MoA envisions two users for the M-Kilimo system and the application: farmers and AEOs. Farmers can already use directly the call and USSD system to get in touch with an AEO. The M-Kilimo application could be used by both farmers and AEO's.

Official user numbers

With the registration and cleaning of the farmers registration database still in process, not only is the number of registered farmers unclear, but also the number of farmers who is actively using this system is unclear, meaning they send sometimes queries through phone call or USSD. Regarding the M-Kilimo app, it is not fully operational yet, therefore, there are de facto zero users, and related to DLI2.3 it can be concluded that there are yet zero users, and the goal has not been reached yet.

M-Kilimo was considered successful because it provided Tanzanian farmers with trusted, government-backed access to agricultural advice through simple mobile tools. Its ease of use, local language support, and wide reach, especially in rural areas, made it a valuable and widely used service (Kilimo Trust, 2023).

To verify these claimed comments, light touch data collection involving about 250 farmers has taken place in five different regions, focusing on maize, cassava and common bean farmers. The results showed that M-Kilimo is, within the group questioned, not as widely known as literature suggested. The large majority of farmers surveyed were unaware of M-Kilimo.

It must be noted that the envisioned M-Kilimo system represents a significant expansion and transformation of the previously existing, query-based M-Kilimo platform, the one reported to have some familiarity among farmers (Kilimo Trust, 2023). Following simple logic, it is of little use to investigate the awareness, or even usage among farmers of a platform which has not yet been released (the new M-Kilimo platform), and which therefore is not providing any service to be used. Despite many farmers might be aware or might even have used the 'old' M-Kilimo, the MoA should not assume it will be sufficient to drive the mass migration of farmers to the reimagined platform. Active engagement, awareness campaigns, and ultimately good marketing will be key to reach the millions of farmers requested by the T-FSRP DLI 2.3.

Dissemination methods

Deep diving into how the current system, dissemination and uptake show some notable gaps. The system currently relies on AEO's (of the 6704 AEO's present in Tanzania, 6527 have already been trained on the system, plus 347 private AEO's), phone calls and USSD. However, the field data (Figure 5) shows these are methods that are currently not widely used, and that radio and TV are still the prime sources for receiving weather forecasts. This can be for several reasons: lack of connectivity (no smartphone, no internet connection or no reception), no awareness of M-Kilimo or other mobile phone services to provide information. Neither do AEO seem to be an information source that is widely used. Since cellular phone ownership is quite high, the most likely cause is the lack of connectivity, costs involved for communication and awareness of M-Kilimo. The latter seems to be two aspects the MoA can improve on for better uptake.

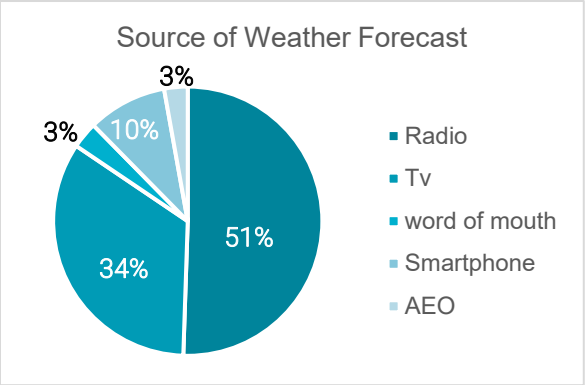

Figure 5. Source of weather forecast used by farmers.

Summarizing, the MoA uses or is planning to use 13% of the used dissemination methods. This exposes a significant gap in reaching farmers and indicates multiple dissemination channels should be leveraged.

Understanding of weather forecast

At this moment, it is unclear how the weather forecast is presented to farmers and if they would understand it. However, related to DLI2.2, the MoA started training EO's, with help from TMA, with the purpose of improving their understanding of weather forecasts and how to formulate actionable advice tailored to the farmer. By this method, the AEO forms the translation of a 'raw' weather forecast into understandable and actionable advice. This is relevant when farmers use AEOs to get weather information, and when the AEO in their turn uses the M-Kilimo app to receive it.

However, when farmers use directly the M-Kilimo app to receive weather forecast, it is not clear yet how the weather forecast will be displayed in the app. Therefore, it is unclear if the information is easy to understand for farmers, if it is intuitive to use and if it needs certain level of education or digital literacy.

User-centered approach

The development of M-Kilimo has so far taken a limited user-centered approach. The call center and USSD system allow a two-way approach, but there is no clear system to gather and evaluate the feedback that could be given through this.

While the app M-Kilimo is still in launching phase, a feedback session and user testing has not taken place yet. There are plans to gather feedback from AEOs during the three months following the launch of the first version. It is unclear what the further feedback and or co-creation process would involve. Although AEOs will provide valuable input, this approach limits the scope of user engagement, particularly since the application is also designed for farmers to use it directly. And an important extinction is that AEO have been/or will be trained, that is lacking for farmers. As a result, the app risks missing important perspectives that could strengthen its relevance and usability across its diverse user base.

Equity of M-Kilimo

As a public institution it is important not to disregard part of the communities, especially because there are often inequalities among gender and youth groups. The M-Kilimo app currently targets only individuals who own smartphones, which introduces an inherent equity bias. To address this, the M-Kilimo system will be reachable via UUSD too, but much limited in its content compared to the mobile app version. On top of that, the Ministry plans to provide farmers with smartphones; however, the scale and cost of this initiative remain uncertain. Moreover, limited field data on M-Kilimo usage—partly due to many farmers indicating that they are not familiar with the app—makes it difficult to assess whether it is currently being accessed equitably across different groups.

7.1.3 Accountability and Transparency

Governance and accountability

It is reported that a steering committee oversees the development of M-Kilimo as a system, including its contribution to achieving the defined DLI's. However, the committee's structure remains unclear from an external perspective, which appears to have contributed to slow processes and delays in decision-making. While outcome indicators are established through the DLIs, there is currently no clear timeline for monitoring and evaluating the app's development known to external parties. Additionally, a formal governance model with defined roles and responsibilities within the MoA and other relevant institutions has not yet been established or shared with or published to external parties.

Partnerships and transparency

The FAO stated that they used to have a close collaboration with the MoA, supporting and enabling the development of M-Kilimo. However, in recent years, the collaboration between FAO and and the MoA has weakened due to institutional transitions, delayed agreements, and communication challenges. These factors have disrupted ongoing projects and slowed the progress of initiatives like M-Kilimo. While the partnership remains important, key-informants note that FAO's engagement with MoA has not been as active or sustained as initially expected. Similarly, the process of formalizing a Memorandum of Agreement with TMA has, according to consulted stakeholder, been in process for years, limiting formal collaboration and data exchange.

Some private sector actors have also expressed concern about unclear boundaries between consultation and implementation when sharing innovations. The Ministry's limited transparency and hesitancy to share information externally have also made collaboration more difficult and even sometimes confusing.

Furthermore, during the course of this assessment, the flow of information and direct communication between the consultants and the MoA has faced some challenges. While this has occasionally slowed progress, it also reflects broader issues related to limited transparency.

7.1.4 Scalability

User-level functionality

Besides the functionality of the M-Kilimo app, the context and use of the app should be discussed. Momentarily the app is not working yet. However, the MoA has a vision on what place the app should have within the current M-Kilimo platform. Currently the system is based on a USSD network. The M-Kilimo app will be added to this part of this system. That means that the app can provide directly information to local AEO's and farmers. Since smartphone penetration in Tanzania is currently not very high (26.9 million, corresponding to 39.5%, TARA 2025), it is assumed that the app would provide mainly a vital information source for AEO's who are provided with a tablet by the MoA. When focusing again on weather information, currently a farmer could raise the question about the weather forecast to an EO. The contacted EO must look up the information in the app and disseminate it back again. The step of searching for the weather forecast or the right information would therefore be simplified by using the app. Simplifying this step in the information chain within M-Kilimo would improve the scalability, since it has been made easier and to access.

However, the average Farmer-to-AEO Ratio is currently 1 AEO per 682 registered farmers and would even be higher when including unregistered farmers. Illustrating theoretically: If every 682 farmer asks 1 AEO on the same day for the weather forecast, the AEO would have to search for this localized and timely information manually and send it back to the farmer in the old system. With the app, the AEO offer could retrieve the information with one click and send it back to the farmer. Decreasing time that it takes to ask, receive and send information increases the scalability of the service. However, it still asks for quite some communication action from both farmers and AEO, which will take time and therefore make it less scalable.

For farmers owning a smartphone, the process however would be fully automated, and they could retrieve the information themselves, making it very scalable. Questions remain how they plan to make it scalable for users that do not have a smartphone. The USSD and call system is in place for this, but scaling is challenging because of increasing costs with increasing numbers.

Systemic functionality

One other big scaling bottle neck that should be mentioned in this process is the interpretation of the weather forecast by a centralized body or AEO, and the translation of that forecast to actionable advice. As the number of farmers using M-Kilimo increases, the workload for extension officers rises proportionally, creating potential bottlenecks and delays in delivering timely information. Furthermore, it remains unclear whether this translation will be centralized at the main extension office or distributed among individual AEOs, which could complicate consistency and efficiency. Without automation or AI-supported interpretation, meeting the information needs of millions of farmers in real time is likely to be resource-intensive and challenging to sustain.

IT scaling capacity

While the ICT backbone of M-Kilimo is steadily maturing, several factors determine its scalability potential. On the positive side, the system already integrates multiple communication channels (USSD, SMS, call center, and a developing smartphone app). The registration of 4.45 million farmers provides a substantial user base and creates a strong foundation for scaling once unified into a clean and centralized database. However, important bottlenecks remain. Taken together, this means that while the technical infrastructure has a basis, operational readiness, institutional capacity, and clarity on data workflows will need to be strengthened significantly before M-Kilimo can expand to millions of users in a reliable and sustainable way.

Scaling uptake

Related to scaling the uptake by farmers of M-Kilimo, there is no clear (published or communicated) plan for that. Farmers will likely not start using M-Kilimo at random. Therefore, a marketing plan needs to be in place, making sure the app is promoted by AEO, commercial, etc. and that the app is fully adopted. This could contain activities such as training to use the app or providing training material like guides or video to achieve that.

7.1.5 Summary and Conclusion on Gap Assessment

A broader review of M-Kilimo shows that, while important progress has been made, significant gaps remain across ICT, dissemination, scalability, and governance. The ICT backbone is largely in place with USSD, a call center, and a farmer database of 4.45 million users, but the app remains incomplete, data workflows unclear, and ICT team capacity limited. Dissemination and uptake are weak, as awareness among farmers is very low and most still rely on TV and radio, channels not yet leveraged by the MoA. Scalability potential exists, yet bottlenecks persist due to low smartphone penetration, low extension officer-to-farmer ratios, and limited automation in interpreting forecasts. Governance also remains fragile: despite a steering committee and outcome indicators through DLIs, decision-making is slow, partnerships are inconsistent, and roles and responsibilities are unclear. To strengthen the initiative, improvements are needed in app integration, outreach and awareness, service automation, equity measures, and a clear governance and partnership model. These strengths and gaps are summarized in Table 3.

Table 3. Overview of gap assessment M-Kilimo

Requirements	Strengths	Gaps
ICT	• Multiple communication channels already in place (call center, USSD, SMS, app under development). • Large farmer registration database (4.45M), with ongoing cleaning for data integrity. • TMA data quality robust and internationally benchmarked.	• App not yet fully functional; weather information not integrated. • Self-registration for farmers not yet possible. • Limited ICT team capacity for maintenance and support. • Small team handling data security and privacy, no clear compliance framework.
Dissemination to and uptake by farmers	• M-Kilimo offers government-backed services, which are easily trustworthy for farmers. • Supports multiple access options (USSD, call center, app planned).	• Very low awareness in practice, most of surveyed farmers were unaware of M-Kilimo and its services. • There is no plan in place yet to increase uptake of M-Kilimo. • Heavy reliance on AEOs, but they are not widely used sources by smallholder farmers. • Farmers primarily use TV and radio for forecasts, channels not leveraged by MoA. • Currently zero app users (not launched yet). • No process of feedback or co-creation with farmers. • Smartphone penetration still low, limiting equity and reach.
Scalability	• Multi-channel ICT backbone exists. • Large farmer registration base provides scaling potential. • For smartphone users, forecasts could be accessed directly, highly scalable.	• EO-to-farmer ratio very high (1:682), creating bottlenecks. • Interpretation of forecasts not automated, creating systemic limits. • Institutional capacity and workflows for scaling unclear. • Very limited use of automated data flows • Relying on the USSD system to reach farmers with no smartphone is difficult to scale due to the cost
Governance	• Existence of a steering committee established to oversee M-Kilimo. • Outcome indicators linked to Disbursement-Linked Indicators (DLIs).	• Steering committee structure unclear, decision-making slow. • No defined timeline for monitoring and evaluation. • Lack of formal governance model with clear roles/responsibilities across MoA and partners. • Weak partnerships outside government. • Limited transparency in communication, both internal and external.

7.2 Other initiatives

Nex to M-Kilimo, many other initiatives exist in Tanzania. These initiatives originate for example from NGO's and private sector. By assessing strengths and gaps of other digital agriculture initiatives, mainly focusing on weather and climate information, lessons can be learned from these initiatives, providing valuable information for M-Kilimo, to work towards a sustainable service. In this section, we will reflect on some services and some aspects in more detail on their strength and gaps. Table 4 describes for each four of the five requirements (financial sustainability is reflected on in Chapter 8), if they fulfill the criteria to become sustainable in technical and social aspects. For the basic information on each service, we refer back to Table 1.

Table 4 - Summary of studied initiative

Initiative	ICT	Dissemination to and uptake by farmers	Scalability	Accountability and transparency	Sustainable Business Model
Beep4Weather	Very Robust	Strong	Medium	Partially Developed	Missing (Donor funded)
Kilimo Thabiti	Very Robust	Very Strong	Medium	Not developed	Missing (Donor funded)
Ugani Kiganjani	Robust	Strong	High	Partially Developed	Missing (Donor funded)
Kilimo Bando	Very Robust	Very strong	High	Well Developed	Present
Uliza-WI Chatbot	Robust	Limited	High	Not developed	Missing (Donor funded)

7.2.1 Ugani Kiganjani

Ugani Kiganjani is a technical framework developed by FAO to provide smallholder farmers with climate-informed agricultural advice. It is available in Tanzania and other countries, offering localized weather forecasts, crop calendars, and tailored farming tips in both English and Swahili. The app is designed to work offline, includes features like push notifications, voice messages and a local services map, and doesn't require user registration. The app seems to have covered multiple building blocks for a sustainable initiative. The ICT backbone is solid, flexible and ready to scale. Information is tailored and multiple dissemination methods are in place, serve different user profiles.

Digging into details on the roll out and operational status of Ugani Kiganjani, it becomes apparent that the app is not used. One reason is the need for a smartphone to use the app. On top of that, it had been indicated that the app has never been promoted or roll-out due to governance dynamics: Initially, the MoA was closely involved, especially during development and early piloting. The idea was that the platform would eventually be managed by the MoA and promoted, with FAO stepping back into more of a technical support role. That transition, however, never really happened.

A major governance issue was the lack of clear institutional ownership. It appears that within the MoA, responsibilities for digital tools like Ugani Kiganjani were unclear. Moreover, momentum dropped when some key players moved position, leading to de-prioritization of specifically the crop production content, which had been a core module. This decision was top-down and political, not technical, but it stalled the platform just before launch.

On top of this, the governance arrangement between FAO and national stakeholders lacked teeth. FAO continued to cover the hosting and backend maintenance costs, but without real buy-in from government partners. In short, Ugani Kiganjani fell into the gap between donor-driven innovation and national institutional commitment.

7.2.2 Kilimo BaNDO

Kilimo BaNDO is a digital agri-fintech platform developed by Bizy Tech that empowers smallholder farmers via USSD technology. It provides integrated services, including savings (Kilimo Akiba), loans (Kilimo Mkopo), insurance (Kilimo Bima), and agronomic support (Kilimo Bora) to enhance financial inclusion, farming productivity, and market access.

The experience of Bizy Tech with digital platforms for smallholder farmers brought to the creation of the Ruzuku Fertilizer Subsidy System, in collaboration with the Tanzania Fertilizer Regulatory Authority (TFRA). The digital platform, built on streamlined farmer registration, eligibility verification, digital voucher issuance, and redemption through agro-dealers, represents a very successful story of public-private partnership. It eliminated inefficiencies and curbed corruption, ensuring transparency and speed in delivery. As a result, the system has reached over 500,000 farmers, boosting fertilizer adoption and crop yields, while making subsidy funds more effective and accountable.

One of the major strong points of the system was the registration of farmers via the Tanzanian ID, which build a first, much needed, high quality farmer database with unique identification code. This step was so important that even the current M-Kilimo uses the same database of registered farmers. During the KII, Buzy Tech defined the role of the MoA as crucial in creating an enabling policy and data environment, while the private sector ensures scalable, innovative services. They encouraged the Ministry to focus on building common farmers and agricultural databases that can benefit all stakeholders.

Lastly, the experience of Buzy Tech in promoting the adoption of digital technology (as a product in their case, but the same holds for the government as a service), has shown that relying solely on internal resources is not enough. Reaching large numbers of farmers, many of whom have limited digital connectivity and knowledge, is prohibitively expensive. To overcome this, Buzy Tech has adopted a partnership-based approach, collaborating with other businesses such as mobile network operators (MNOs), input suppliers, and output buyers. This allows their digital service to be bundled with offerings that farmers are already familiar with, increasing both accessibility and adoption and leveraging existing networks.

7.2.3 Kilimo Thabiti

Considering the uptake of information by farmers, Kilimo Thabiti provides a good example of initiatives that prioritize accessibility. Within the Kilimo Thabiti project, farmers in the Mara region receive twice a week the weather forecast through SMS. An evaluation has taken place to assess the actual uptake. For example, a questionnaire conducted among farmers highlighted the role of weather forecast SMS services in improving agricultural productivity and supporting decision-making. The study found that timely and accurate weather information delivered via SMS not only raised awareness about climate change but also directly influenced key farming practices. Farmers expressed high levels of confidence in both the accuracy and clarity of the forecasts, which further encouraged their willingness to adapt to changing climatic conditions. This shows the clear potential of digital climate information services in helping farmers mitigate the effects of extreme weather.

Besides the uptake of farmers, the dataflow behind the system is completely seamless. The creation of the weather forecast and the tailored sending of the SMS is fully automated, meaning no manual labor is required in the data flow. It prevents delays in delivering weather information to farmers, enhancing scalability while reducing labor costs. In summary, it saves both time and money, two critical factors for achieving successful scale-up.

7.2.4 Farm Radio & Beep4Weather

Farm Radio International (FRI) uses another approach to reach farmers and increase uptake. Instead of relying on mobile phones, smartphones or cellular phones, they provide rural communities with a radio and work together with local radio stations and TMA to broadcast the weather forecast. By using this approach, Farm radio International reaches the rural communities who are often overlooked.

Next to the radio broadcasting FRI has developed a service called Beep4Weather. Beep4Weather service offers an efficient, automated solution for delivering weather forecasts and agricultural advice to farmers. Farmers initiate the service by placing a missed call ("beep") to a designated number. The system then automatically returns the call, providing a recorded message with the latest weather forecast and relevant

farming tips. To maintain the relevance and timeliness of the information, local radio stations collaborate with the TMA to gather and record up-to-date weather data and advisory content. These recordings are regularly updated to reflect current conditions and forecasts, ensuring that farmers receive accurate and timely information, but the process is not fully automated. Nonetheless, this approach allows farmers to access essential weather information at their convenience, without the need for live operators or internet access, making it particularly beneficial for those in remote areas with limited resources.

7.2.5 Uliza-WI Chatbot

The Uliza-WI chatbot is an automated agro-weather advisory tool developed by Weather Impact. The tool is currently available for free on Telegram, and it is being tested and rolled out in several African countries with the support of local partners, such as the local meteorological offices. While it is a powerful and extremely scalable dissemination tool, its adoption proved to be challenging. This is partly due to the innovative nature of the tool, which can be accessed only by smartphone owners and requires a data bundle. However, the main factor slowing down the increase of users is that the tool is based on user-driven interaction, which is very costly to create and maintain in terms of both time and resources. Limited digital literacy plays a role too, requiring in-person workshops to effectively board new users.

8. CURRENT COST STRUCTURE

8.1 The Scale-Financial Stability Paradox in Digital Agriculture

M-Kilimo represents a significant national investment aimed at modernizing the agricultural sector. The platform's success hinges on overcoming a key paradox: large-scale adoption typically requires heavy subsidization (the Business-to-Government or B2G approach). However, sustainability demands diverse and commercial revenue streams.

The official context of M-Kilimo highlights the importance of public financing and oversight. The e-Kilimo platform is supported by a US$3 million budget, funded by the European Union and jointly managed by the Tanzanian government and the United Nations. The MoA intends to provide expert technical support, particularly to farmers in remote areas, and to enhance the accountability of AEOs through mandatory annual performance evaluations and feedback forms. This mandate underscores its function as a public good.

8.2 Cost Structure M-Kilimo

M-Kilimo platform is attempting to provide digital climate advice to farmers but needs a long-term funding plan that doesn't rely solely on government or donor money. Most similar projects fail because they can't become financially independent. The main dilemma is that, to reach many farmers, the service must be cheap or free. However, to be sustainable, it needs to have an independent revenue stream. Another issue is that, implementing a mobile app is more cost effective, however, this is difficult to promote in rural Tanzania due to lack of or limited connectivity to electricity, poor internet connectivity and low smartphone use.

The cost structure for high-volume enterprise communications is segmented and opaque. Players range from small local backyard players to large multinational players covering multiple countries. M-Kilimo being a digital service, necessitates a deeper dive at the moving parts that drive the highest cost.

8.2.1 Bulk SMS (Application-to-Person - A2P):

One of the major cost drivers in the current M-Kilimo system is the bulk SMS platform, which would be essential for sending timely and frequent weather forecasts to farmers. The pricing model for SMS delivery is heavily influenced by volume commitments and validity periods. Low-volume packages (1–5,000 SMS) typically cost between TZS 24.0 and 30.5 per message, whereas high-volume enterprise agreements (exceeding 1 million SMS) can reduce rates to around TZS 10.7 per message.

However, the effective cost is considerably higher once regulatory charges are applied. An 18% VAT and several additional government levies significantly increase the final operational cost. This regulatory layering means that the true operational floor for reliable, compliant A2P (Application-to-Person) messaging is substantially above the nominal per-SMS rate.

Moreover, the real cost of the SMS service lies not in the price per message but in the scale of recipients. For example, if M-Kilimo serves 1 million farmers and sends four SMS messages per week (at an estimated cost of TZS 12.6 per SMS, inclusive of VAT), the total weekly expenditure would amount to approximately TZS 50,504,000 (USD 20,572). This illustrates how even modest message frequency at scale can quickly translate into significant operational costs.

8.2.2 USSD Services:

As a digital platform operating in a mobile-first environment, M-Kilimo relies on both USSD and SMS technologies to reach farmers and AEO's across the country. The investment profile involves significant upfront costs. Securing a dedicated USSD shortcode — which provides exclusive branding rights and full keyword control (e.g., 14801#) — requires a setup fee of up to USD 6,000, with annual maintenance costs of about USD 3,500. Approximately 34% of the setup costs and 70% of yearly maintenance expenses are paid as fees and levies to the TCRA.

A more affordable alternative is a shared USSD shortcode (e.g., 14801*……#), which carries a lower setup fee of about TZS 150,000 (roughly USD 60) and separate integration fees per telecom operator. However, this model introduces ongoing operational costs due to monthly rental fees per telco. Maintaining a basic national presence across the main MNOs — Vodacom, Airtel, Tigo, and Halotel — incurs a minimum recurring monthly fee of around USD 330 (USD 110 per telco for three operators).

In addition to these base costs, USSD sessions are billed per use. Each session costs approximately TZS 45 for Airtel, Tigo, and Halotel, and around TZS 75 per 20 seconds for Vodacom, which charges per second rather than per session. Consequently, a typical 180-second interaction would cost about TZS 45 for Airtel, Tigo, and Halotel, but as much as TZS 675 for Vodacom.

As with SMS, the true USSD service cost lies in the number of users and interactions rather than in setup or maintenance. If M-Kilimo serves 1 million farmers with four interactions per week, the estimated total cost would be TZS 918,300,000 (USD 374,054). This is based on current market shares (Vodacom at 31%, Airtel and Tigo at 28% each, and Halotel at 15), leading to ((310,000 × 625) + (280,000 × 45) + (280,000 × 45) + (150,000 × 45)) × 4 = TZS 918,300,000 (USD 374,054) per week, with Vodacom accounting for more than 90% of the total.

Currently, these costs are covered by the government, allowing farmers to use the USSD service free of charge since the government prepays for outgoing messages. The operational costs for the current M-Kilimo system are estimated by the MoA (extension department) at around TZS 3 million per month under the older platform, which is still in use. During the ongoing development and testing phase of the upgraded platform, monthly costs have risen to about TZS 5 million, and they expect expenditures to double or triple once the system is fully deployed. Total cost levels will ultimately depend on the number of active users.

8.2.3 Mobile Application

Developing and maintaining a mobile application involves high costs, but these costs come primarily from capital and technology requirements rather than from paying staff. In other words, mobile apps are capital-intensive, not labor-intensive. While local software developers are relatively affordable, earning between TZS 487,631 and TZS 2,783,307 per month even after five years of experience, the main expenses come from the initial development, infrastructure, and ongoing maintenance of the app.

For a mobile application, the initial development cost can range from USD 100,000 to 300,000 or more. On top of that, there are annual maintenance and update costs, typically 15–20% of the original development cost, which cover bug fixes, software upgrades, and support. These costs increase quickly and make owning and running a native mobile app a long-term financial commitment.

Because of these high upfront and recurring costs, app development is not suitable for rapid deployment or early-stage market entry. Organizations looking to launch quickly or test new services often need to consider alternatives, such as web-based platforms, USSD systems, or partnerships that reduce the capital burden.

8.2.4 Total Expected Costs

Table 5 provides a summary of estimated costs for M-Kilimo's potential communication pathways, along with current specified operational expenses as indicated by the MoA. Figures reflect both monthly and annual costs and are based on the assumptions and calculations discussed in the preceding sections.

NOTE: these cost have been computed using commercial rates, as the MoA was not able to provide detailed information on their cost structure, and whether they are benefiting from discounted rates from the MNOs.

Table 5. Cost pathway for different dissemination channels. The costs have been computed using commercial rates, as the MoA was not able to provide detailed information on their cost structure, and whether they are benefiting of discounted rate from the MNOs.

Channel	Assumption	Estimated monthly cost (TZS)	Estimated annual cost (TZS)	Notes
SMS	1M farmers 4 SMS/week TZS 12.6/ SMS	219,000,000	2,628,000,000	Scales linearly with users and frequency
USSD	1M farmers 4 interactions/week	3,923,000,000	47,075,000,000	Vodacom drives >90% of total due to per-second billing
Mobile App	Yearly maintenance 15–20% of initial development (USD 100–300K)		36,750,000 – 147,000,000	Annual maintenance (excl. initial development)
Current operational costs estimated by MoA (USSD system) -		5,000,000	60,000,000	Expected to double/triple once fully deployed (≈TZS 10–15M/month)

The table clearly shows that SMS is currently the cheaper option, but costs rise significantly when scaling beyond one million users. Additionally, SMS is limited as a one-way communication channel. In contrast, mobile app development is more expensive upfront but offers greater flexibility, much more possible content for different services and the potential to reach a much larger user base. The table is guiding in cost, but it does not draw final conclusions, as many other factors must be considered when evaluating the best approach.

8.3 Willingness to Pay

One way of covering high cost of either SMS, USSD or mobile application, is getting revenue directly from users. The B2C model for services like M-Kilimo depends on the willingness and the ability of farmers to pay. Several studies have been investigating the willingness-to-pay of farmers, for the weather and climate information services. For example, this study in Bangladesh investigates farmers' willingness to pay for climate information services (CIS). The study found that over 90% of farmers who participated in the CIS co-development and training were willing to pay for the services, compared to 75% of a control group without prior exposure to CIS. Farmers expressed willingness to pay an annual subscription fee ranging from US $11.45 to US $16.36. The study indicates that the cost of the service and prior exposure and training to CIS were the main factors influencing farmers' willingness to pay (Paparrizos, S., Kumar, U., Amjath-Babu, T. S., & Ludwig, F. (2021)).

In a scientific study in Mali, two products from an insurance company where piloted: an agriculture insurance product, and the same product complemented with the weather forecast. The project has been evaluated with an RCT and willingness to pay for the service has also been assessed. The results showed that farmers having received bundled services (insurance product, weather forecast and agronomic advice) had a mean willingness to pay of EUR 1.42 for the season, while the control group and the

insurance only group were willing to pay respectively EUR 1.03 and 1.05 for the season (Georg-August-Universität Göttingen, Weather Impact & OKO. (2025)).

Next to these two studies, the Kilimo Thabiti project also performed a short evaluation on farmers' willing-to-pay for the service they had received during the pilot. The amount indicated by farmers ranged between TZS 24 to 28 per SMS (circa 0.01 USD) (Weather Impact, TARI, TYEGD, & Esoko, 2025).

Within the current project, a light-touch data collection has taken place. The survey also touched upon the value of climate and weather information services and the willingness-to-pay. In Figure 6, the questions were asked: are you willing to pay for Weather forecast or DCAS. From the left figure, it can be deduced that the majority does not want to pay for the weather forecast (from the farmers who receive weather forecast). Diving deeper in the results does not suggest this is correlated to the source of the weather forecast (radio, TV, AEO, nearby people, or smartphone), to the frequency of receiving, trustworthiness or understandability of the SMS, or willingness to pay. Therefore, the most likely conclusion is that in this survey, most farmers are just not willing to pay.

In the right figure, it shows the about 2/3 of the questioned farmers, who had received digital climate information or training, were willing to pay for it. This could be more related to the reported usefulness of the service or training. For the data it becomes apparent that most farmers who found it very useful, are willing to pay, and farmer that did not find it useful, were less willing to pay. Moreover, DCAS usually goes further than weather forecast. Where a weather forecast is primarily a presentation of information, DCAS also contains interpretation and advice.

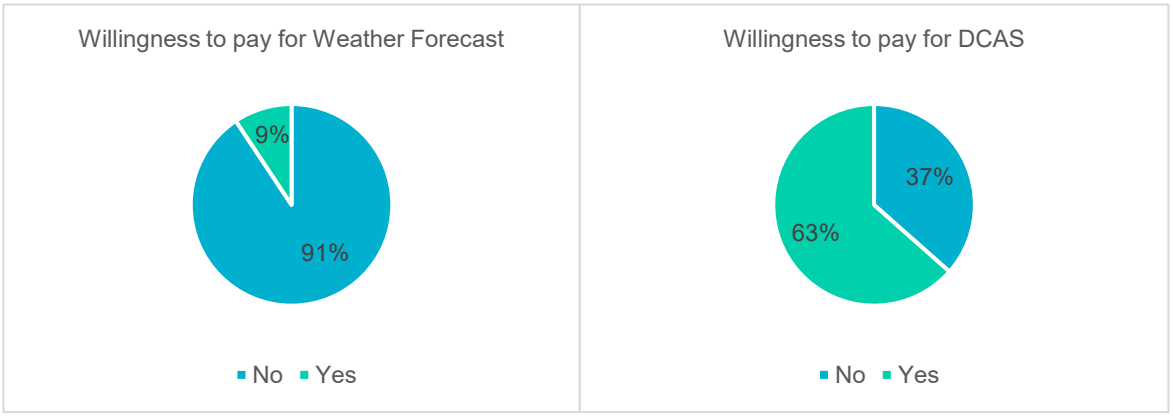

Figure 6. Willingness to pay by farmers for weather forecast/DCAS

The farmers that indicated to be willing to pay for weather forecast or DCAS were on average respectively 6436 TZS and 1976 TZS per month.

What can be concluded by these mentioned studies is, firstly, that farmers' willingness-to-pay for weather and climate information services is highly variable. The willingness is most likely, as indicated by literature, context-dependent, influenced by factors such as prior exposure, training, and perceived usefulness. However, it also suggests that when farmers are directly engaged, trained, and they perceive the weather or climate information as useful, farmers are willing to pay for an amount ranging between 0.09 and 3.47 USD per month. This indicates there is potential in a business model where farmers contribute to financing. Different business models, including this as component, will be discussed in Chapter 10.

8.4 Short Evaluation of Cost Structure of Other Services

Looking at other services, similar issues arise as with M-Kilimo. Organizations are covering their costs by donor funding providing their services for free. For example, FRI even recovers the cost of the farmers, by taking away the cost from farmers with their Beep4Weather application.

Kilimo Bando provides digital solutions for farmers accessible via USSD, eliminating the need for smartphones. The platform functions primarily as a marketplace where farmers can purchase inputs and sell outputs, and agribusinesses can transact with farmers. It also offers an advisory service, including weather and climate information, but focuses on actionable recommendations rather than raw data. The

business model is B2B2C, generating revenue through subscription fees from suppliers and service providers, as well as transaction commissions on trades between farmers and suppliers, typically ranging from 1.5% to 3%. These revenues cover operational costs, including platform maintenance, data management, advisory services, marketplace facilitation, and USSD session costs, ensuring the service remains affordable for farmers while maintaining financial sustainability.

9. ROOM FOR OPTIMIZATION

In the previous chapters, a gap assessment of M-Kilimo and other initiatives was presented. This section concludes on that by drawing lessons learned from the analysis and identified room for optimization. Prior to this, field data on farmers' needs will be examined to inform the identification of improvement areas from a user perspective. Based on both the lessons learned and the field insights, some intermediate conclusions will be outlined, pointing to priority areas where improvements are most needed.

9.1 Optimization from User Needs

To ensure good uptake of services, the daily habits, needs, and demands of farmers should be clear. To complement knowledge on this topic, farmers questionnaires from the regions Mbeya, Songwe, Dodoma, Arusha and Mara are analyzed. Questions were asked such as if they use DCAS, if they find it useful and how the information is used. In Figure 7, the results are shown. It becomes clear from the left figure that more than half of the farmers who receive DCAS used the information in their farmer practices. The right figure indicates that about 80% of the farmers who received DCAS found the information somewhat useful to be very useful. Only 6 % found the information not very useful, or not useful at all.

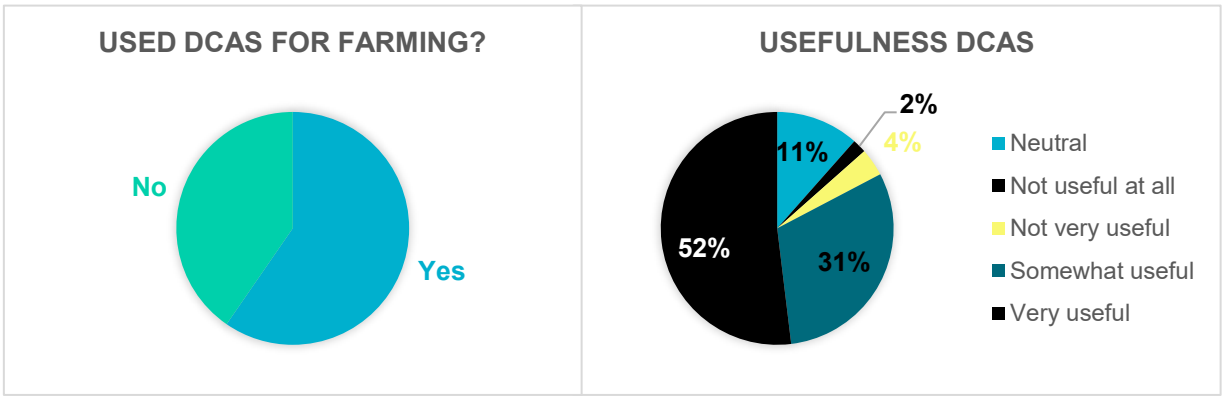

Figure 7. Usage and usefulness of DCAS for farming practices

Next to assessing the usefulness of DCAS information is for farmers, The questionnaire focused on what farmers used the DCAS information for. Figure 8 shows that the information was mainly applied to general farming practices and planting decisions. The study in the Mara region within the Kilimo Thabiti project supports these findings. In the survey, only a small group of farmers reported using the information for crop or variety choice. This is interesting, as it contradicts findings from a study in Central Kenya. This study finds that farmers use seasonal forecast information for crop and variety choice (Guido et all., 2020).

What we can learn from these results is that the content of the DCAS information could influence the type of decision farmers make. Short-term weather forecasts tend to affect immediate farm activities, such as weeding or fertilizing, whereas long-term seasonal forecasts are more likely to guide crop and variety choices. Planting decisions are often linked to the onset of the rainy season. The different actions, related to different types of weather information, emphasize the importance of not only short-term and de-contextualized weather forecast, but more long-term specialized information that indicates when the rain is expected, and

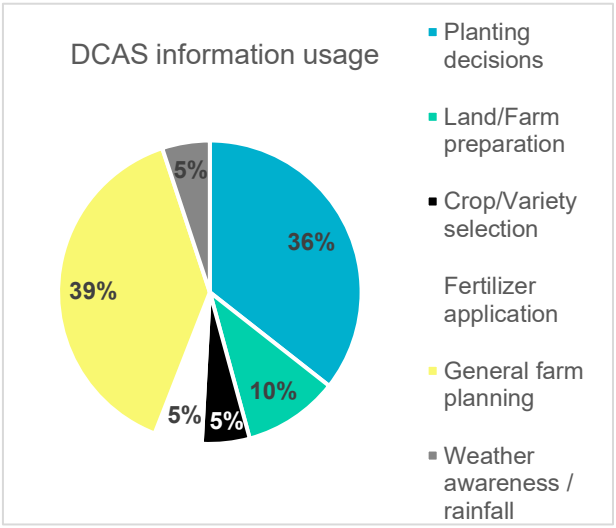

Figure 8. Usage of DCAS for different farming practices

the provision of actionable advice related to the information, such as planting recommendations.

9.2 Identified Area's for Optimization

Based on the gap assessment of M-Kilimo, the lessons learned and the field insights, some intermediate conclusions will be outlined, pointing to priority areas where improvements are most needed. A summary is given in Table 6.

Table 6. Overview of strength, gaps, lessons learned and identified improvements per requirements

Requirements	Strengths	Gaps	Lessons learned form other Initiatives and field work	Identified improvements
ICT	• Multiple communication channels already in place (call center, USSD, SMS, app under development). • Large farmer registration database (4.45M), with ongoing cleaning for data integrity. • TMA data quality robust and internationally benchmarked.	• App not yet fully functional; weather information not integrated. • Self-registration for farmers not yet possible. • Limited ICT team capacity for maintenance and support. • Small team handling data security and privacy, no clear compliance framework.	• Large farmer registration database based on farmers ID is essential and first starting point for a functional system	• Finalize app content and data integration. • Enable self-registration and continuous updating of the farmer database. • Clarify and standardize data interpretation workflows. • Strengthen ICT team capacity, including maintenance and security. • Develop clear data protection and privacy policies • Create strong core ICT system that enables multiple dissemination methods.
Dissemination to and uptake by farmers	• M-Kilimo offers government-backed services, which are easily trustworthy for farmers • Supports multiple access options (USSD, call center, app planned).	• Very low awareness of M-Kilimo. • There is no plan yet to increase uptake of M-Kilimo • Heavy reliance on AEOs, but they are not widely used sources. • Farmers primarily use TV and radio for forecasts, channels not leveraged by MoA. • Currently zero app users (not launched yet, only registered users). • No process of feedback or co-creation with farmers • Smartphone penetration still low, limiting equity and reach.	• Leveraging different channels increases uptake of services, especially among • Without promotion or activities to support roll-out of the service, uptake can stay behind Co-designing a system with farmers and AEO increases uptake	• Use a broader mix of dissemination methods, including radio and TV. • Strengthen and better utilize the AEO network for outreach. • Invest in local-level marketing and awareness campaigns. • Build farmer trust through consistent quality and accessibility of information. • Build trust and increase uptake by co-designing the service

Scalability	• Multi-channel ICT backbone exists. • Large farmer registration base provides scaling potential. • For smartphone users, forecasts could be accessed directly, highly scalable.	• EO-to-farmer ratio very high (1:682), creating bottlenecks. • Interpretation of forecasts not automated, creating systemic limits. • Institutional capacity and workflows for scaling unclear. • Very limited use of automated data flows • Relying on the USSD system to reach farmers with no smartphone is difficult to scale due to the cost	• Expand call center with automated weather forecast and advice • Weather forecast can be automatically produced locally and timely through SMS, saving on time and labor • Mobile application provides opportunity to generate automated weather forecast and advice based on location and time of user	• Define clear user-scaling strategy (smartphone vs. non-smartphone), covering multiple dissemination channels fitting with different user profiles • Explore automation/AI-supported interpretation of forecasts. • Strengthen EO support system and capacity. • Find solution for the less-scalable USSD system
Governance	• Steering committee established to oversee M-Kilimo. • Outcome indicators linked to Disbursement-Linked Indicators (DLIs).	• Steering committee structure unclear, decision-making slow. • No defined timeline for monitoring and evaluation. • Lack of formal governance model with clear roles/responsibilities across MoA and partners. • Weak partnerships outside government • Limited transparency in communication, both internal and external.	• (Institutional) and personal roles and responsibilities must be clearly defined from the start • Digital tools succeed when they are embedded in local governance systems—not when they rely solely on external or project-based momentum. • Provide sustainable funding mechanisms: Move beyond donor dependence • Prioritize continuity and institutional memory: Document processes and responsibilities to reduce disruption from staff turnover or restructuring.	• Establish clear governance structure with defined roles. • Develop monitoring and evaluation timeline for app development. • Formalize partnerships and improve partner engagement. • Increase transparency and consistency of information sharing. • Clarify boundaries with private sector to ensure fair collaboration

10. BUSINESS MODELS

The pathway to long-term operational sustainability for initiatives such as M-Kilimo is fraught with challenges, primarily stemming from reliance on unsustainable funding models that characterize many DCAS projects across the continent. The critical mission for M-Kilimo is not merely scaling service delivery but establishing genuine financial stability that persists beyond initial public or donor grants.

Various business models have been tested across different countries to deliver agricultural advisory services effectively and sustainably. These include Business-to-Consumer (B2C), where services are sold directly to farmers; Business-to-Government (B2G), where governments contract services for broader public access; and Business-to-Business-to-Consumer (B2B2C), where private companies or NGOs integrate advisory services into their offerings to farmers. In the paragraph below, different business models are discussed, including examples from other services.

10.1 Business-to-Consumer (B2C)

The business to consumer model relates to the farmers directly paying for the services they use. There are a few examples of companies using a B2C business model for agricultural advisory services. However, there seem not to be many advisories that get directly paid by farmers for weather or climate advisory services.

A good example of a B2C business model of agricultural advisory services is the company iSDA. iSDA's Virtual Agronomist demonstrates a near-B2C / hybrid advisory model. Farmers connect directly with the service via WhatsApp, obtaining tailored field-level agronomic guidance. Advice for staple crops (for example maize, sorghum) is provided free or on a "resilience-first" basis, while more advanced or premium-level features are designed for commercial or cash crops. This freemium scheme, combined with cross-subsidization and partnerships, allows iSDA to reach smallholder farmers broadly, though there is not yet clear public evidence that the premium features are widely paid for by farmers across all contexts. It must be noted that they do not provide weather or climate information, so it is not an example that works for that type of information.

Based on Esoko's experience, the B2C business model doesn't work. Farmers are only willing to pay for services that give them a clear and immediate profit, not for general weather forecasts or agronomic advice. As mentioned in the previous chapter, most farmers also indicated they are not willing to pay for weather forecast.

During conversation with the MoA, it became clear that they have thought about generating revenue for the ministry by charging farmers directly. They propose an Uber-model to connect farmers with AEOs within M-Kilimo, a functionality where farmers can locate nearby AEOs, view the services they offer, see their availability, and request services; much like booking a ride on Uber. The platform would also display pricing, allowing farmers to compare and choose based on cost, location, or expertise.

10.2 Business-to-Business-to-Consumer (B2B2C)

The B2B2C model has gained traction due to its ability to leverage existing networks, reduce distribution costs, and bundle services with products like seeds or fertilizer. Bundling can increase the added value, and therefore farmers' willingness to pay. The study in Mali where weather forecast and insurance were combined, provides a valuable example for that. The pilot demonstrates a B2B2C approach by bundling weather alerts and agronomic advice with index-based insurance. Farmers received actionable weather forecasts alongside advisory guidance, which enhanced their confidence in farm management and influenced decision-making. The results indicate that the bundled service increased willingness to pay, customer satisfaction, and maize yields compared to both the control and insurance-only groups. Satisfaction and recommendation scores were also higher for the bundled offering, highlighting the added value of the integrated service. By combining a financial product with advisory services, they leverage business partnerships to reach farmers effectively, providing them with actionable information while maintaining financial sustainability—illustrating the potential of multi-layered B2B2C solutions in agriculture (Georg-August-Universität Göttingen, Weather Impact & OKO. (2025)).

Next to this example, in Tanzania, Bizy Tech represents a strong example of a B2B2C agritech model. The company's revenue model demonstrates the B2B2C approach: it combines subscription fees from

suppliers and service providers with transaction commissions of 1.5–3% on trades between farmers and suppliers. This dual structure allows Bizy Tech to serve farmers directly while anchoring its financial sustainability in business partnerships, highlighting the effectiveness of the B2B2C model in digital agriculture.

B2B2C is the most effective model. Private companies (like seed suppliers or insurers) pay M-Kilimo to access its network of farmers. The climate advice is then "bundled" with a product the farmer is already buying. This shifts the cost from the farmer to the business.

10.3 Business-to-Government-to-Consumer (B2G2C)

Public-Private Partnerships (PPPs) offer a viable way to scale and sustain agricultural services by leveraging the strengths of both the public and private sectors. Governments bring scale, legitimacy, and long-term policy frameworks, while private actors contribute to technology and innovation. Rather than building systems from scratch, the MoA can integrate or co-develop private-sector solutions, reducing development and operational costs, avoiding duplication, and allowing public funds to focus on underserved areas or subsidizing access for vulnerable farmers.

The B2G2C hybrid structure formalizes this relationship:

1. The Government (G): The MoA owns and maintains the core national infrastructure (the unified Farmer Registry, basic M&E systems, and regulatory frameworks). It funds essential public goods (Tier 1).
2. The Private Partner (B): Private businesses deliver customized, high-value, integrated services (e.g., bundled financial products, specialized AEO logistics). They pay fees or commissions to the MoA for access to verified farmer data and distribution scale (Tier 2 and Tier 3).
3. The Consumer (C): Smallholder farmers receive essential public services for free, while accessing subsidized and higher-value commercial services via private partners.

10.4 Sustainable Business Model for M-Kilimo: a B2G2C Hybrid Approach

10.4.1 The Scale-Financial Stability Paradox in Digital Agriculture

M-Kilimo, recently launched as e-Kilimo, represents a significant national investment aimed at modernizing the agricultural sector. The platform's success hinges on overcoming a key paradox: large-scale adoption typically requires heavy subsidization (the Business-to-Government or B2G approach), yet sustainability demands diversified, commercial revenue streams. Viable delivery models require providers of Agromet services to consistently bundle different service types and diversify revenue streams to ensure the offerings are impactful and viable.

The official context of M-Kilimo highlights the importance of public financing and oversight. The e-Kilimo platform is supported by a US$3 million budget, funded by the European Union and jointly managed by the Tanzanian government and the United Nations. The Ministry of Agriculture (MoA) intends for the platform to provide expert technical support, particularly to farmers in remote areas, and to enhance the accountability of agricultural extension officers (AEOs) through mandatory annual performance evaluations and feedback forms. This mandate underscores its function as a public good.

However, the ambition to scale digitally must contend with fundamental infrastructural barriers. The feasibility of relying on digital delivery models is severely limited by poor rural connectivity and low smartphone penetration. Data from the International Telecommunication Union (ITU) indicates that only 31.9% of Tanzanians are online and according to the TCRA statistics for the quarter ending June 2025, Smartphone Penetration was 36.75%. Furthermore, small business adoption is hindered by concerns over high upfront and maintenance costs, low digital literacy, and limited availability of technical staff. A successful business model cannot be purely digital or B2C; it must integrate analog solutions and shift the cost burden away from the end-user.

10.4.2 Shifting the Business Model

M-Kilimo's greatest asset is its verified database of smallholder farmers. This data is extremely valuable to private companies like banks, insurers, and crop buyers who need reliable information to offer their products to farmers. The plan should be to leverage this asset.

Based on available data, the experience of the writing partners, the local context, and insights gathered from interviews, we recommend that M-Kilimo adopt the following revenue module. This model leverages a combination of public and private resources to ensure financial sustainability while delivering high-value services to farmers. By structuring revenue across multiple tiers, M-Kilimo can maintain a stable financial base, scale operations efficiently, and continue providing essential climate and agricultural advisory services to smallholder farmers.

It creates five layers of revenue to ensure financial stability:

1. Tier 1: Public funding (government)
    - What it is: Government and donor funds pay for the core platform, the farmer database, and basic weather alerts.
    - Who pays: MoA / development partners
2. Tier 2: Commercial bundling (business)
    - What it is: M-Kilimo charges private companies a subscription or commission to sell their products (like insurance, seeds, or loans) bundled with climate advice to farmers on the platform.
    - Who pays: Agribusinesses, banks, insurers, input providers
3. Tier 3: Data sales (business)
    - What it is: M-Kilimo sells aggregated and anonymous data insights (e.g., crop yield predictions, pest outbreak patterns) to financial institutions and buyers. This data helps them reduce their risk.
    - Who pays: Financial institutions, commodity buyers
4. Tier 4: Climate finance (business/government) (optional)
    - What it is: This is a major new opportunity. M-Kilimo can become the official national platform for monitoring, reporting, and verification (MRV) of agricultural carbon credit projects.
    - Who pays: Carbon project developers

In the next chapter, phased implementation will be discussed of this hybrid model.

5. Tier 5: Data as Collateral (Emerging High-Value)

This new tier represents a fundamental shift from prediction (Tier 3 credit scoring) to securitization. Here, the farmer's individual, verifiable data becomes a bankable asset they can use as collateral. This model is distinct from Tier 3, which uses aggregated, anonymized data for insights.

- **The Mechanism:** The model uses the "digital collateral" concept, proven by Pay-As-You-Go (PAYGO) solar companies. Enforcement is not physical repossession, but a temporary, reversible "lockout" from high-value M-Kilimo services (like the farmer wallet or premium market access). This creates a powerful, low-cost incentive for repayment.
- **The Asset:** The farmer's asset is their "data wallet," a secure, farmer-controlled repository of their longitudinal data. This includes verified yields, input purchase histories, on-farm practices, and payment/sales records. This data proves the farm's capacity to generate future income, allowing lenders to value the asset.
- **Precedents:** Companies like Apollo Agriculture are already perfecting the *valuation* side (advanced credit scoring) , while PAYGO companies like PEG Africa have proven the *enforcement* side (digital lockout).

- **Requirements:** This model requires a "farmer-centric" data governance model where farmers legally *own* their data. The greatest hurdles are ensuring true "informed consent" from farmers with low digital literacy and operating in a legal void, as Africa currently lacks specific legal frameworks for farm data contracts

Table 7 - Proposed Multi-Layered Revenue Streams for the B2G2C Hybrid Model.

Revenue Stream Tier	Service Provided	Payer	M-Kilimo Role	Estimated Contribution to Sustainability
Tier 1: Public Good Funding (G2C)	Core weather alerts, Farmer Registry maintenance, AEO M&E system.	MoA / Development Partners	Public (MoA Managed)	Foundation (Covers fixed infrastructure costs, essential for legitimacy) 1
Tier 2: Commercial Bundling (B2B2C)	DCAS integrated with insurance, inputs, or credit.	Private Partner (Agri-techs, Banks).	Hybrid (Revenue Share/Platform Fee)	High (Increases farmer WTP/adoption and provides scalable transaction volume) 13
Tier 3: Data Monetization (B2B)	Aggregated, anonymized market/risk data insights.	Financial Institutions, Commodity Buyers.	Public (Regulator/Broker)	Medium (High-margin, non-extractive revenue; vital for credit scoring) 18
Tier 4: Climate Finance (B2B/B2G)	Digital MRV (Monitoring, Reporting, Verification) services for CSA adoption.	Carbon Buyers / Project Developers.	Public/Hybrid (Data Verifier)	Emerging High (Taps into Tanzania's VCM potential) 21
Tier 5: Data as Collateral (B2B/B2C)	Farmer's verified data (yields, payments) used as digital collateral for loans.[8]	Farmer (Asset-Holder), Financial Institutions (Lender).	Public (Data Verifier), Hybrid (Enforcement)	Future High (Unlocks large-scale, low-cost private credit)

11. CONCLUSIONS

This section builds on the analyses in this report and provides follow-up actionable recommendations for government action on the identified areas for improvement. Moreover, it will provide recommendations related to implementation of the proposed business model. Recommendations will be focused on which steps to take, and when to take them, and most importantly how to take them. Before diving in into the recommendation, also some cross cutting issues will be discussed.

What became apparent from the analyses so far is that the MoA has been focusing on creating the IT backbone from M-Kilimo, before rolling out, and scaling and governing an operational system. Moreover, a financial model has not yet been thought through. Successful services need to fulfill these multiple aspects and doesn't stay with ICT development. In other words, the MoA has taken important initial steps toward strengthening M-Kilimo, though the process will require time and continued effort to fully mature. Progress should focus on solving individual problems step by step, while keeping sight of the broader objectives.

11.1 Cross Cutting Issues

One example of key cross-cutting issue in the development of M-Kilimo is finding the balance between making digital agricultural services affordable and accessible to all farmers, while ensuring that the system remains financially sustainable for the MoA and its partners. On one hand, public digital advisory services should be low-cost or free to encourage uptake among smallholder farmers, many of whom face economic constraints or limited access to smartphones. On the other hand, maintaining and expanding such a system requires substantial financial and technical resources. This trade-off between inclusiveness and cost recovery influences decisions across all levels of system design, governance, and scaling. Considering development of the service, the MoA is advised to think this through and prioritize it.

The move toward digital agriculture, while promising, inherently risks excluding farmers who lack the devices, connectivity, or skills to participate. M-Kilimo's reliance on smartphones and data-based communication channels introduces a bias toward more digitally literate and economically advantaged users, often men and younger farmers. Addressing this gap requires a multi-channel approach: maintaining USSD and call-center access, linking with radio programs, and supporting digital literacy through AEOs. In addition, systematically researching the inequalities faced by these marginalized groups and co-designing solutions with them is essential to ensure inclusivity. Intentional targeting and monitoring of gender and youth inclusion should be embedded in system design, while governmental oversight and support play a critical role in making sure no farmer is left behind, preventing digitalization from widening existing inequalities.

Moreover, designing effective digital solutions for smallholder farmers requires fit-for-purpose approaches that reflect their real-world contexts. Smartphone usage is often shared within households or among neighbors, complicating user identification and personalized service delivery. This is further worsened by the agricultural focus of M-Kilimo. If the platform is to provide crop-specific farming advice, a clear distinction will have to be made between *farms* and *farmers*. Currently, M-Kilimo registers farmers, but each farmer may manage multiple fields in different locations, cultivate different crops across those fields, or even practice intercropping within a single plot. These layers of complexity, from shared device access to diverse, multi-location farming systems, should be addressed. The system must find the right balance between necessary simplification for usability and sufficient detail to ensure the advisory service remains relevant and accurate for decision-making at the plot level.

Another key cross-cutting consideration for M-Kilimo is how to balance centralized coordination with localized relevance. The current system relies on a national data flow, yet the effectiveness of agricultural and weather advisories depends on how well they reflect local realities. Automation of weather forecasts on high resolution with dissemination with digital tools, such as mobile app or automated SMS updates, can help bridge part of this gap by delivering fast, timely and consistent messages to large numbers of users. As the Kilimo Thabiti iniative showed, it is possible to automize actionable advice related to the weather forecast to local context. However, local capacity building and farmer engagement are still required for the uptake and effective use of weather and advisory services. Therefore, while automation can improve efficiency, sustainable success depends on combining centralized systems for data consistency with localized structures for contextual relevance and farmer support, it is important to

improve these systems parallel, to make sure farmers will not distrust M-Kilimo, which would undermine the whole service.

M-Kilimo is primarily a government initiative, yet its long-term success depends on effective collaboration with the private sector. The MoA's leadership ensures public accountability, structured databases and alignment with national development goals, but leveraging private-sector innovation and efficiency is essential for keeping the system dynamic and financially sustainable. Private companies bring technical expertise, business discipline, and innovation capacity that can help accelerate the development of new services (e.g improved user interfaces, localized weather analytics, or bundled input-supply services) without requiring the Ministry to build everything from scratch. For these partnerships to succeed, clear roles, transparent communication, and mutual trust are critical.

11.2 Pathway to Financial Sustainability

11.2.1 Conclusion & Recommendations

M-Kilimo cannot achieve financial sustainability by relying on traditional B2G grants or non-existent B2C fees. A stable path requires implementing a diversified B2G2C hybrid model based on rigorous public-private engagement. The strategy is to use government funds to build a valuable public asset (the farmer database) and then leverage that asset to generate revenue from the private sector through service bundling, data sales, and climate finance.

The strategic innovation lies in leveraging M-Kilimo's identity as a public asset:

1. **Monetizing Data Integrity**: The MoA's investment in the unified farmer register (the B2G function) is not just a cost but also a valuable asset that de-risks private sector engagement. Monetizing the resulting high-integrity, anonymized data (Tier 3) will provide a high-margin revenue stream crucial for financial institutions and commodity buyers, effectively allowing the private sector to fund the public infrastructure they rely upon.
2. **Pivoting the AEO Service**: The proposed "Uber-model" for AEOs should be executed via private partners (B2B2C), with M-Kilimo acting as the authoritative regulator and certifier. This strategy transfers high operational risk and logistics friction to the private sector while M-Kilimo generates B2B revenue from accreditation and performance data services.
3. **Capturing Climate Finance**: M-Kilimo's technical architecture, particularly its M&E capacity, positions it uniquely to solve the most critical barrier to agricultural carbon credit projects in Tanzania: verified Measurement, Reporting, and Verification (MRV) mechanism. By formally establishing M-Kilimo as the national digital MRV platform (Tier 4), the system can tap into a high-potential, high-value revenue stream from the Voluntary Carbon Market (VCM), ensuring long-term financial viability tied directly to national climate resilience goals.
4. **Securitizing Data as an Asset:** The model's most transformative potential lies in Tier 5. This moves M-Kilimo beyond just *analyzing* data (Tier 3) to *securitizing* it as a farmer-owned asset. By empowering farmers to pledge their verified data (yields, payment history, practices) as digital collateral, M-Kilimo can unlock access to larger, lower-cost private credit. This is enforced via a "digital lockout" mechanism, a proven, low-cost alternative to physical repossession.

Adopting this hybrid, multi-layered revenue strategy, underpinned by strong regulatory frameworks and targeted blended finance, is the necessary departure from the "business as usual" model, ensuring M-Kilimo's long-term scale and financial independence in Tanzania.

11.2.2 Phased Implementation for the Hybrid Model

The roadmap focuses on strategically stabilizing the public foundation before scaling commercial partnerships. The main steps are also summarized in a separate document called 'Roadmap to a Financially Sustainable M-Kilimo', found as Annex.

Phase 1: Stabilization and Institutional Integration (0-12 months)

The primary focus is establishing the institutional foundation and finalizing the core G2C services. Key actions include integrating the unified farmer registry fully with M-Kilimo and establishing the formal legal and policy framework for PPE, clearly defining terms for data sharing, liability, and revenue split. Crucially, the MoA must execute the regulatory pivot: stopping internal development of AEO logistics and establishing official certification and accreditation processes for private AEO service providers, such as MazaoHub. This phase relies heavily on Tier 1 (Public/Grant) funding.

Phase 2: Commercial Pilot and Bundling (12-36 months)

The goal of this phase is to validate the B2B2C revenue tiers. This involves piloting bundled services with a minimum of three distinct private partners (e.g., one input supplier, one index insurer, and one microfinance institution). The collective consent data governance policy must be fully implemented to manage Tier 3 revenue generation responsibly. The willingness-to-pay for premium, certified AEO services should be tested rigorously through certified private partners, generating the first scalable Tier 2 commissions.

Phase 3: Scaling and Climate Finance Integration (36+ months)

This final phase focuses on achieving self-sustainability and maximizing high-potential revenue streams. Successful B2B2C bundles must be scaled nationally. Concurrently, M-Kilimo must be officially rolled out as the national digital MRV platform for agricultural carbon projects (Tier 4), leveraging Tanzania's large potential in the (VCM). Formal fee structures for both verified data insights (Tier 3) and MRV verification (Tier 4) must be finalized and implemented.

Phase 4: Data-as-Collateral Pilot (48+ months)

This advanced phase focuses on piloting the Tier 5 "Data as Collateral" model. This cannot be implemented until the legal and ethical foundations are secure. Key actions include establishing a clear legal framework for farmer data ownership, as this is currently ambiguous in the African region. M-Kilimo must first deploy "data wallets" that give farmers secure control and ownership of their individual data. Crucially, this phase must be preceded by intensive digital literacy and financial education campaigns to ensure farmers give true "informed consent". The pilot should begin with high-literacy farmer groups, bundling data-secured loans with the digital lockout enforcement mechanism as a last resort.

11.2.3 Pathway to Reach T-FSRP DLI's

As reported in Section 4.3, the disbursement of funds allocated by the World Bank to the MoA to develop and roll out the new M-Kilimo platform are strictly dependent on the achievement of the DLI 2 and its sub-DLIs. A pathway of short-term recommendations is provided to bridge the gap between the current state of M-Kilimo and the DLIs targets.

DLI 2 unfolds as:

- DLI 2.1: Rollout of 5 new service functionalities on M-Kilimo by FY 2024/25.
  Current Status (beginning FY 2025/26): The M-Kilimo app is mostly a mock-up; services, especially the weather component, are not yet integrated and functional.
- DLI 2.2: Training of 1,500 EOs (30% women) in FY 2024/25 and 2,500 in FY 2025/26, toward a total of 4,000 trained.
  Current Status (beginning FY 2025/26): The extension department of the MoA stated that 6527 AEOs were already trained as of July 2025. However, trainings should be repeated once the M-Kilimo app is live to ensure that they will be able to access and use the new digital tool.
- DLI 2.3: Reaching 500,000 farmers (30% women) by FY 2025/26, and 1.5 million in total with e-extension services, either with early warning messages and/or submitted queries through the M-Kilimo.
  Current Status (beginning FY 2025/26): As the M-Kilimo app is not yet available to the public, the service has virtually no users yet.

Important note: while the following road map focuses on relatively short-term activities, the MoA should keep as main focus the pathway to sustainability described in the previous section. Solely achieving the DLIs is not a guarantee of a successful and financially stable service after FY 2027/28, when the T-FSRP project and subsequent funds will end. Reaching the DLI targets to secure the funds to develop the service is as important as building a long-term framework for the success of M-Kilimo in the next decades.

Phase 1: Stabilization and Core Launch of M-Kilimo digital services (app and SMS alerts) (FY 2025/26)

This phase addresses mostly DLI 2.1, as without a stable and publicly available digital platform it is impossible to achieve any results of the other sub-DLIs. Therefore, we recommend the MoA focusing on releasing the M-Kilimo app which is operation-ready and scalable for large number of user interactions, but with a limited number of functionalities. We suggest starting by with the weather information service, given the progress in the collaboration with TMA.

Table 8 - Proposed Phase 1 actions to reach T-FSRP DLIs.

DLI	Actionable Recommendations	Expected Results
2.1	1. Finalize and launch the weather information service: - Integrate TMA API for daily weather updates - Implement basic data visualization modules (icons, temperature, rainfall amount and probability) - Operationalize early warning system for extreme events via the M-Kilimo app or via SMS	- Weather service is live and accessible in M-Kilimo by mid of FY25/26. - Data is updated daily automatically, without manual intervention. - Early warning is generated automatically, without manual intervention
2.1	2. After M-Kilimo is operational, soft launch of additional services. We propose: - Early Warning for pest/disease: integrate alerts from TARI, establishing SOP for fast communication, pivotal for timely alerts. - Seasonal Production & GAP: upload static content (pdfs, texts) on Good Agricultural Practices for 3 major crops (e.g., maize, cassava, beans).	- Early warning for pest/disease and GAP modules visible to all users by the end of FY25/26
2.2	3. Performed AEO trainings focus on the weather component: - Partner with TMA to conduct mandatory training for 1,500 EOs on using the M-Kilimo app, with a focus on interpreting the new weather service and communicating it onwards to farmers. Ensure 30% are women.	- 1,500 EOs trained and registered as active app users by the end of FY25/26.
2.3	4. Start to bring user to M-Kilimo: - Use the existing USSD/call center to push notifications to registered farmers, informing them of the new weather service. - Equip trained AEOs with a target to onboard min. 50 farmers each into the system (primarily via USSD queries), aiming for the first 75,000 active users.	- System logs show 75,000 unique farmer interactions with M-Kilimo (via any channel) in Q1 of FY26/27.

Phase 2: **Scaling and Service Enhancement (FY 2026/27)**

Once a first, stable version of the service is launched, the MoA can focus on achieving the mid-term DLI targets: improving the existing services, launching the additional ones to achieve five services (DLI 2.1), expanding the training (DLI 2.2), and, mostly importantly, launching a national awareness campaign to address DLI 2.3.

Reaching 1.5 million users is by far the most difficult DLI to achieve. M-Kilimo platform, excluded some big advantages in terms of resources available and the credibility given by the MoA, is in principle no different than any other digital commercial service available to Tanzanian smallholder farmers. This means that, most likely, adoption by large numbers of users will not take place spontaneously after the platform is made available. A large loyal user base will need to be built up via constant engagement, an efficient network of fields agents, and on top of all, marketing.

The strong point of the MoA in this context is the institutional network of AEOs, which can provide a solid user-base at the start of the process. However, relying only on this method, reaching 1.5 million users with about 7000 AEOs will require that each of them onboards at least 215 farmers. Experience on the ground has shown that introducing new technologies to smallholder farmers is a very intensive task, which often entails more than directing the farmer to the correct app in the Google Play Store, or sending a link on WhatsApp. Some farmers might need multiple hours of individual help, if their digital literacy is low. On top of that, when looking further ahead than the T-FSRP, if the goal is to reach most of the farmers'

households, it becomes clear that relying on the AEOs network alone is not feasible, as it is well known that it has shortage of extension staff. Good marketing, a country-wide awareness campaign will be therefore essential to gather more users in a cost-effective way.

Table 9 - Proposed Phase 2 actions to reach T-FSRP DLIs.

DLI	Actionable Recommendations	Expected Results
2.1	5. Launch/enhance of all five services: - Market prices: include in the app daily price data from major markets for 5 key crops. - Digital recognition for pest: launch initial version, for instance as an image library, or as a form to repost pest to an AEO. - Enhance weather information module: add seasonal outlook from TMA bulletins.	- All five service buttons in the app are functional, contain relevant information, and are updated by mid FY26/27
2.2	6. Scale AEO training and capacity: - Train next 2500 AEOs (min. 30% female), focusing on all five services and digital literacy. - Establish a ToT program to create sustainable and recurrent internal training on M-Kilimo new functionalities and updates.	- A total of 4,000 EOs are trained and active by end of FY26/27.
2.3	7. Launch a national awareness campaign: - Partner with radio stations to broadcast weekly segments on M-Kilimo's weather and market advice. - Run targeted SMS campaigns to the entire farmer database promoting the free USSD code. - Leverage local government authorities to promote M-Kilimo at the village level.	- Active user base reaches 500,000 by end of FY26/27 (DLI 2.3 first target). - Campaign reach and farmer recall are measured through quick surveys.

Phase 3: Sustainable Growth (FY 2027/28)

Assuming that Phase 2 delivers a complete, operational and user-proved M-Kilimo platform, this phase focuses on reaching and consolidating the 1.5 million user base, improving service quality based on feedback, and lays the groundwork for post-T-FSRP financial sustainability.

Table 10 - Proposed Phase 3 actions to reach T-FSRP DLIs.

DLI	Actionable Recommendations	Expected Results
2.1	8. Absorb user feedback and improve services: - Collect structured user feedback and convert them into improvement points for both user experience and service content. - Automate as many processes as possible, especially related to early warning, weather information and market prices. - Formalize the process for updating the app content, such as the GAP and market information.	- User satisfaction surveys show improved ratings for usability and relevance. - System analytics show increased repeat usage of the app.

2.3	9. Reach 1.5 million users and build PPP: - Intensify Radio and SMS marketing - Initiate B2B2C Pilots: onboard 2-3 agribusinesses (i.e. a seed company, an insurer) to bundle their services with M-Kilimo advisories. Their outreach efforts will directly contribute to new user acquisition. - Analyze user data to understand what drives engagement and double down on those services.	- Total cumulative reach of 1.5 million active farmers is achieved by end FY27/28. - At least two B2B2C partnerships are formally launched.

11.3 Recommendations on Governance and Operational Structure

Problem Identification

The M-Kilimo platform is a complex, multi-stakeholder national asset that functions as a B2G2C (Business-to-Government-to-Consumer) ecosystem. Its current collaborative, yet decentralized, structure appears to create operational friction and informational silos. This disorganization can hinder data sharing among partners, slow down decision-making, and make it difficult for stakeholders to get a clear, consolidated view of the platform's operations and roadmap.

Recommendation

To ensure M-Kilimo's long-term sustainability and scalability, it is essential to formally transition its management from a collaborative project to a high-performing agritech entity with a clear, centralized governance structure.

This begins with appointing a single, accountable executive (**a CEO or Program Director**) with proven, cross-domain expertise in both agricultural technology (agritech) and financial technology (fintech). This leader must be empowered to build and manage a formal organizational structure with specialized, high-functioning departments. Based on agritech best practices, this structure should include, at a minimum:

1. Core Technology & Product

- Engineering: A dedicated team responsible for building and maintaining the core platform, the "Jembe Pesa" farmer wallet, USSD functionality, and all critical system infrastructure and API integrations.
- Product Management: A team that owns the product roadmap, conducts farmer-centric user research, and translates the needs of farmers, AEOs, and private partners into technical specifications for the engineering team.
- Data Science & Analytics: This is a mission-critical team. It is responsible for building and refining the "score engine" for digital credit, analyzing agronomic and climate data, and developing the data products for the Tier 3 (aggregated insights) and Tier 5 (data-as-collateral) revenue models.

2. Go-to-Market & Operations

- Business Development & Partnerships: A strategic team focused on managing the "B" in the B2G2C model. Their sole function is to identify, negotiate, and manage partnerships with the private sector (banks, insurers, input suppliers, tech partners).
- Farmer Operations & Support: An operationally-focused team responsible for all non-technical, field-level activities. This includes managing farmer onboarding, running the "Village Digital Agent (VIDA)" network, and deploying digital literacy and support programs.

3. Strategic & Foundational Teams

- Agronomy & Domain Expertise: A team of agricultural experts who ensure the platform's digital advisories are scientifically sound, locally relevant, and effective. They would also oversee the certification and quality control for the AEO "Uber-model."
- Policy, Legal & Compliance: This is essential for a B2G2C partnership. This team manages the relationship with the government, navigates all public-private partnership (PPP) contracts, and

ensures the platform is fully compliant with Tanzania's emerging data protection and financial regulations.

Benefits of this Structure: Implementing this formal structure will eliminate operational ambiguity, create clear lines of accountability, and streamline communication. It positions M-Kilimo to be managed effectively as the sophisticated, high-growth technology platform it is designed to be, attracting both private capital and top-tier talent.

How Rwanda's experience offers a governance blueprint for M-Kilimo

Rwanda faced a challenge similar to M-Kilimo's current situation: agricultural information systems were fragmented, underutilized, and lacked authority to compel data sharing. The initial response, the **Agricultural Information and Communication Center (CICA**), functioned as a passive information repository and failed to overcome institutional silos.

The turning point came with a governance, not technological, reform. CICA was restructured into the Agricultural Information and Communication Program (AICP) and embedded within the Ministry's central project implementation unit. This repositioning gave the program authority to mandate data interoperability across donor- and government-funded agricultural projects. At the same time, Rwanda separated public governance functions from technical execution by contracting a private technology partner to manage software development, product design, and user support.

This dual-engine model, government-led governance and content validation, paired with private-sector-led product and engineering execution, enabled Rwanda to establish a "single source of truth" for digital agricultural advisories, improve system performance, and sustain the platform financially through transaction-based revenues.

Annex 5 contains a more detailed explanation of this case study, and why and how this is relevant for the future of M-Kilimo.

11.4 Recommendations on Other Requirements

Next to recommendations on implementing a sustainable business model, other steps are discussed here to reach the other requirements.

11.4.1 Enable Location Based, Frequently Updated and Automated Weather Forecast in App

One recommendation is to invest in more automated weather forecasts in the short term. This would not only result in more timely and accurate information for farmers (building trust) but also save time in budget in automating the process, both leading to scale. To achieve this. The following information should be considered.

This recommendation assumes that TMA provides daily weather data in raw format to the MoA, in a programmatic way, for instance via an automated API. To enable localized weather forecasting, these data should be geo-referenced on a latitude–longitude grid and shared in a structured file format such as .netcdf or .json. To integrate localized weather forecasts into the M-Kilimo application, the IT infrastructure should include two main modules:

1. Data visualization module
2. Data processing module

The **data visualization module** is a software component that takes processed weather data (typically for a specific location) as input, usually in formats such as .csv or .json, and converts them into user-friendly visual outputs.

These visualizations may include:

- Weather icons representing conditions such as rain, sun, or clouds.
- Tables or charts showing forecasted conditions for upcoming days.
- Color-coded variables (e.g., shades of blue to indicate different rainfall intensities).

- Warning messages in cases of extreme or hazardous weather.

The goal of this module is to present complex meteorological data in a clear, intuitive format that can be easily understood by end users, such as farmers.

The **data processing module** handles raw input data, such as netcdf files provided by TMA, to extract, process, and format the information required by the visualization module.

This includes:

- Extracting localized data**:** For instance, if a farmer is located in Dodoma (approximately lat=−6.16, lon=35.73), the software must identify and extract data from the grid cell closest to these coordinates. With a spatial resolution of 0.1°, this would correspond to the cell centered at (lat=−6.2, lon=35.7).
- Data transformation**:** For instance, if the input contains hourly rainfall forecasts but the visualization module requires daily accumulations, the processor should aggregate the hourly values into daily totals. Similar transformations apply to variables such as temperature, relative humidity, and wind speed.
- Condition coding: For instance, if the visualization relies on icons or pictograms, the processor must classify and encode forecasted weather conditions accordingly (e.g., "rainy," "partly cloudy," "storm").

. Summarizing, The IT department should establish a daily automated routine that:

1. Retrieves the raw weather data from TMA.
2. Processes the data using the processing module.
3. Passes the processed output to the visualization module for display within M-Kilimo.

Because this is an operational service, it is essential to implement error handling, system checks, and data backups to ensure reliability. For example, if input data are missing or incomplete, the system should display a warning message in the app rather than showing outdated or incorrect forecasts. This ensures that users are always aware of data availability.

11.4.2 Lower USSD Costs

As long as M-kilimo is mainly dependent on the USSD system, the cost of USSD will be an issue for scaling. There are a few suggestions to reduce this cost:

(1) Investigate Cluster User Groups (CUG). A CUG is a telecommunications service offered by Mobile Network Operators (MNOs) that enables a pre-defined set of subscribers, such as a company's employees or members of an organization like M-Kilimo registered farmers, to communicate with each other at significantly discounted or even free rates. This supplementary service creates a "private network" within the broader public mobile network, primarily aimed at reducing communication costs for the group's members via voice, SMS, and potentially data, with USSD serving as a potential channel for content delivery or basic self-service options within such a group. MNOs profit from CUGs by securing large, consistent subscriber bases and often by selling bundled services. This option would provide an opportunity to lower USSD costs for both farmers and the MoA. Moreover, the fact that there is also something in it for MNO's provides ingredients for long term positive collaboration.

(2) Moreover, we recommend inclusion of the weather advisory retrieval in the USSD menu and rebuilding of the system to enable users to go back to the last step before timing out to improve the user experience. This also helps to reduce costs since the user doesn't need to repeat all the previous steps they have already completed. And on the cost aspect, we recommend engagement with TCRA and MNOs to find ways to improve the cost. In a country where more than 65% mobile users don't afford smartphones and rely on USSD to access critical functions, Specific to Vodacom, they should be engaged to even the playground with a per session billing. In the same breath TCRA and legislature should be engaged to regulate and harmonize the USSD session costs as they did for internet bundles.

(3) USSD to trigger PUSH SMS, another practical and cost-effective way is to use USSD to self-register and trigger push SMS notifications for Agro-weather advisory. USSD sessions are short lived and

expensive compared to SMS, so instead of users having to use the USSD to check for information, they can just trigger automatic regular updates using USSD.

11.4.3 Lower Tax Burden

The TCRA, established in 2003, is the independent body responsible for overseeing the electronic communications industry in Tanzania, governing licensing, promoting effective competition, and enforcing compliance. The financial structure of communication services in Tanzania is marked by a cumulative application of taxes and levies that significantly inflate the final cost passed on to M-Kilimo and other businesses. This layered system contributes substantially to the operational floor price of services like Bulk SMS and USSD access.

The overall tax burden includes: Value Added Tax (VAT): 18% applied to electronic services, Excise Duty: 17% applied specifically to electronic communication services - This tax is paid by the Electronic Communication Service provider, although the economic burden is inherently incorporated into service pricing, TCRA Levy: 1.1% of turnover, UCSAF Levy: 0.9% of turnover - designated to fund services in underserved rural areas and Service Levy: 0.3% of turnover. This cumulative financial layering necessitates businesses engaging in digital communications budget significantly above the base price for high-quality routes.

We recommend engaging with the Tanzania Communications Regulatory Authority (TCRA), the Tanzania Revenue Authority (TRA), and Mobile Network Operators (MNOs) to officially designate agricultural SMS services as a public need. This designation should be used to facilitate the zero-rating of these SMS services, thereby stimulating growth in the agricultural sector.

11.4.4 The "Uber Model" for Extension Officers: a Flawed Idea

While innovative, and it would create revenue, this approach raises several concerns. Key among them is equity: many smallholder farmers in remote areas may lack smartphones, mobile data, or the digital literacy needed to access such a service. There's also the risk of uneven service delivery, as AEOs might prioritize more profitable or accessible locations, leaving others area empty. Additionally, without proper oversight, the quality of advice could vary widely, and incentive-driven models might favor quick visits over meaningful support. Pricing poses another challenge; dynamically based pricing could make services unaffordable for poorer farmers. Finally, data privacy is a critical issue: farmers' personal and agricultural information could be misused if the system lacks strong transparency and protection mechanisms. Overall, while the model has potential, these risks must be addressed to ensure creating this revenue creation model. Moreover, the implementation of an Uber-model seems to be still a long way off, since the app is not close to being developed yet.

We recommend: For an effective, efficient and sustainable uber-like AEOs model, the farmer and the extension officers must have access to a smartphone. Instead of operating the service, M-Kilimo should **regulate and certify** all AEOs. Private companies could then build the actual booking apps and pay M-Kilimo a fee for access to its list of certified officers and performance data. This turns a risky operation into a reliable source of income.

11.4.5 Financial Structuring

Attracting private capital requires blended finance: use Development Finance Institutions (DFIs) to reduce the perceived risk of smallholder agriculture. DFIs can use grants, concessional loans, and guarantees to de-risk B2B2C components. Technical assistance grants can help private partners integrate their systems with M-Kilimo (as seen with Apollo Agriculture in Kenya). Public funds are also needed to capitalize the MRV infrastructure development for Tier 4.

11.4.6 Policy Recommendations

Three key policy interventions are essential to ensure the longevity of the M-Kilimo B2G2C model:

1. **Regulatory Framework for Public-Private Partnerships**: Transparent regulations governing PPE must be established. This includes defining clear rules for private sector participation, benefit-sharing, and accountability, which are necessary to build the institutional trust and predictability required for long-term private investment.

2. **Explicit Open Data Policy**: The MoA must formally define which datasets constitute open public goods (Tier 1) and which aggregated, anonymized datasets can be commercially brokered (Tier 3). This policy must protect farmer interests by adhering to the collective consent governance model, guaranteeing that data monetization is responsible and contributes directly to the subsidized provision of public services.
3. **Targeted Digital Literacy Investment**: The constraints of low digital literacy and poor connectivity severely impact the adoption rate of B2C services and the efficiency of the "Uber-model". The government must aggressively partner with national programs and educational institutions to integrate Agri-digital training into extension and vocational curricula, enhancing the capacity of both farmers and AEOs.

11.4.7 Make Use Private Sector Innovations

Lastly, we would like to once again recommend that the MoA leverage existing innovations from the private sector and NGOs, particularly on the technical front, rather than building systems from scratch. Numerous proven solutions already exist such as Kilimo Thabiti, Ugani Kiganjani and FRI, and many organizations, both private and nonprofit, are eager to collaborate.

11.5 Recommendations on M-Kilimo Contribution to Tanzania's Job Creation Agenda

In this last section we address M-Kilimo platform contribution to Tanzania's job creation agenda and preservation of existing agricultural livelihoods against climate hazards. There are two distinct but related impacts:

1. **Job Preservation:** Protecting the primary livelihood of farmers from climate-related shocks.
2. **Job Creation:** Generating new economic roles and entrepreneurial opportunities within the digital agricultural ecosystem.

1. Preserving Farming Livelihoods Against Climate Hazards: The foundational role of the M-Kilimo model is defensive and preservation: to safeguard the millions of smallholder farming jobs that are the backbone of the economy. These livelihoods are directly threatened by climate change, which leads to unpredictable weather, declining rainfall (causing reduction in crop production), and increased floods and droughts. The model's recommendations directly preserve these jobs in the following ways:

- **Climate Resilience through DCAS (Tier 1):** The platform's core Digital Climate Advisory Services (DCAS) are a primary tool for safeguarding the millions of small-scale producers. By providing farmers with integrated climate information, M-Kilimo helps them make decisions that build resilience. Evidence shows that farmers who use such advisories self-report significantly lower yield losses from weather-induced crop damage compared to those who do not (e.g., 16% loss vs. 24% loss). This direct protection of yield is a direct preservation of the farmer's income and job.
- **Enabling Climate-Smart Agriculture (CSA):** The advisories and financing models (Tiers 2-5) are designed to promote the adoption of Climate-Smart Agriculture (CSA) practices, such as agroforestry. CSA practices are proven to help farmers withstand climatic stresses while improving their livelihoods by increasing crop productivity and income. By financing and verifying these practices, M-Kilimo helps maintain the long-term viability of farming as a profession.
- **Financing Productive, Resilient Assets (Tiers 2 & 5):** The model's financing tiers, particularly the bundling of loans (Tier 2) and the "data-as-collateral" model (Tier 5), enable farmers to access high-value, climate-resilient assets. A prime example is solar-powered irrigation. This technology directly counters the primary threat to rain-fed agriculture by reducing dependence on rainfall, a critical intervention in drought-prone areas. This financing preserves farming livelihoods by mitigating their most significant climate risk.

2. Creating New Jobs and Economic Roles

Beyond preserving existing jobs, the M-Kilimo hybrid model is an engine for *new* job creation, making the agricultural sector more attractive to younger, tech-savvy generations. The African Union's digital strategy, which this model aligns with, identifies the digital economy as a key factor in stimulating economic growth and jobs. New jobs are created in four main areas:

1. **New Digital Ecosystem Jobs:** The M-Kilimo platform itself, and the private-sector partners it enables, creates a new sub-sector of Agri-fintech jobs within Tanzania. These are skilled positions essential for the platform's operation, such as:
    - **Agri-Digital Lending Specialists:** Professionals who design and manage digital loan products, analyze customer behavior, and collaborate with financial institutions and AgriTech firms.
    - **Village Digital Agents (VIDAs):** As seen in similar UNCDF projects in Tanzania, the platform relies on a local agent network. These VIDAs are new, rural-based jobs, acting as an information point, a customer support hub, and an agent for financial service providers.
    - **High-Skill Technology and "Back-Office" Jobs:** M-Kilimo platform has a significant, long-term demand for high-skill to develop, innovate, and maintain the sophisticated Agri-fintech solutions that power the entire system. This creates a demand for domestic technology jobs, moving beyond basic IT support to include software and app developers, systems integration & API specialists, database administrators and system coordinators, UI/UX designer and platform maintenance and QA staff.
2. **New "Green Jobs" (Tier 4):** The recommendation for M-Kilimo to serve as a digital Monitoring, Reporting, and Verification (MRV) platform for carbon credits (Tier 4) directly unlocks a massive new employment market.
    - The Africa Carbon Markets Initiative estimates that the continent's carbon markets could create 30 million green jobs by 2030.
    - These jobs are created by enabling smallholders to generate new income streams through carbon credit sales, such as from interplanting fruit and nitrogen-fixing trees, which has been shown to triple harvests and transform livelihoods in projects in Kenya and Ethiopia.
3. **New Entrepreneurial Jobs (AEO "Uber-Model"):** The recommendation to pivot from a public-only extension model to a certified private-sector model (the "Uber-model") fosters entrepreneurship.
    - Public extension is currently understaffed, reaching as few as 10% of farming households. The M-Kilimo platform, by acting as a regulator and certifier, would enable qualified extension officers to launch their own private advisory businesses.
    - This fosters "entrepreneurship in extension", creating new business opportunities for skilled individuals to support local economic development and rural communities through digital platforms.
4. **New Renewable Energy Jobs (Tiers 2 & 5):** By financing productive assets like solar irrigation pumps, M-Kilimo creates demand in the renewable energy sector.
    - The PAYGo solar market is a significant driver of employment, with projections in West Africa alone reaching 150,000 jobs by 2022.
    - This also creates new service model jobs. For example, "Irrigation-as-a-Service" models, where a provider manages the solar irrigation system, create new, full-time technical jobs for staff, in addition to the new jobs created on the farms that now have water.
5. **Creating New Data and Risk Assessment Jobs**

The M-Kilimo model's most sophisticated tiers (Tiers 3, 4, and 5) are, in essence, a new engine for the data economy. This engine creates a clear demand for jobs related to credit scoring and risk analysis, which currently may be underdeveloped in the rural agricultural sector.

- From Manual to Digital: Currently, many local lenders (like Saccos) may use manual or paper-based methods to assess a farmer's creditworthiness, relying on local knowledge, crop yields, and sales figures. The M-Kilimo platform digitizes this entire process.
- New Market for "Scoring as a Service": This digital transformation creates a new B2B market for specialized tech firms. We see precedents for this, such as Kenyan tech firms being hired to build a "Farmers Credit Scoring Model" for financial institutions by developing an AI model to digitize and analyze existing farmer data. This creates jobs for:
    - Data Scientists & AI/ML Specialists: Professionals are needed to build, test, and maintain the complex algorithms that can analyze “alternative data", such as mobile phone usage, satellite imagery, and on-platform behavior, to create accurate credit profiles for farmers.
    - Fintech Product Managers: These roles (like the "Agri Digital Lending Specialist") are created *within* financial institutions and their partners. Their job is to design new digital loan products and collaborate with AgriTech firms to analyze customer behavior and loan performance.

12. ANNEXES

ANNEX 1. List of References

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ANNEX 2. TMA DCAS INITIATIVES

Initiative	Dissemination Channels	Target Users	Key Collaborators	Areas of Activity
Seasonal & Special Agrometeorological Bulletins	- National TV & radio- Newspapers- TMA website- Email & PDF circulation to ministries & extension services- Press conferences	Farmers (via extension), policymakers, NGOs	Government ministries (Agriculture, Water, Disaster Mgmt.), FAO, WMO (technical support)	Nationwide
Dekadal & Agrometeorological Products (Agromet Database)	- TMA web portal- Maps & graphs (rainfall, NDVI, drought, onset/cessation)- Shared with agricultural research institutes	Farmers, researchers, planners, extension staff	WMO, Regional Climate Centres (ICPAC), national agriculture institutions (TAFS, SUA)	Nationwide
FarmSMS (TMA SMS service)	- Direct SMS alerts to farmers & extension officers	Farmers, extension officers	Local telecom providers, agricultural extension networks, research partners (e.g., Sokoine Univ. of Agriculture in pilots)	Pilot districts (e.g., Coast, Morogoro)
National Early Warning / EW4All	- Mass media (radio, TV), TMA's online platforms Social media (WhatsApp groups, Twitter, Instagram, Facebook, YouTube) Government circulars- Website alerts	Whole population, incl. farmers	WMO (technical), UNDRR, Disaster Management Dept., Ministry of Agriculture	Nationwide
Outreach at Nane Nane Agricultural Fairs & Public Campaigns	- Face-to-face farmer interactions- Flyers & posters- Demonstrations of forecast tools	Farmers, cooperatives, local gov't	Ministry of Agriculture, NGOs (e.g., CCAFS, FAO), farmer groups	Regions hosting Nane Nane exhibitions (e.g., Morogoro, Mbeya, Dodoma)
M-Kilimo	Mobile App	Farmers, extension officers	Ministry of Agriculture	Nationwide

ANNEX 3. LIST OF KEY INFORMANT INTERVIEWEE

Name	Organisation	Role	Date	Mode
Paschalina Hayuma	Ministry of Agriculture	DLI2 coordinator within MoA	Several occasions	E-mail and in person
Upendo Mndeme	Ministry of Agriculture	Extension coordinator within MoA	Several occasions	E-mail and in person
Violet Kiamozo	Ministry of Agriculture	ICT coordinator within MoA	Several occasions	E-mail and in person
Timotheo Semuguruka	Ministry of Agriculture	T-FSRP coordinator within MoA	March 2025	E-mail and in person
Batti Gombero	Tanzania Meteorological Agency	Agrometeorolist	Several occasions	E-mail and online video
Sophia Kessy	SNV	Climate Adaptation and Impact Adviser	July 2025	E-mail and in person
Dioguen Zaridze	FAO	IT consultant and project manager Ugani Kiganjani	May 2025	E-mail and online video
Ingrid Ronglan	WFP Tanzania	Climate Services Advisor	Several occasions	
Mponda Malozo	Norges Vel	Climate Services User Engagement Expert	May 2025	E-mail and online video
Bruce Kisitu	iSDA	Director of Operations, Africa	July 2025	E-mail and online video
Susuma Msikula Susuma	Farm Radio International Tanzania office	Program Coordinator	July 2025	E-mail and in person
Rahim Shoo	Bizytech	CCO	July 2025	E-mail and in person

ANNEX 4. ROADMAP TO FINANCIAL SUSTAINABILITY

Roadmap to a Financially Sustainable M-Kilimo

Recommendations from the report 'Assessment of M-Kilimo and DCAS in Tanzania'

M-Kilimo represents a significant national investment aimed at modernizing the agricultural sector. The platform's success will depend on overcoming key paradoxes associated with digital services in agriculture and on the Ministry of Agriculture's ability to develop a sustainability strategy based on diversified, commercial revenue streams. The roadmap is divided into two phases: Phase 1, focused on short-term actions to ensure the success of the M-Kilimo platform is in line with the targets of the T-FSRP, and Phase 2, aimed at long-term strategies to ensure that M-Kilimo continues beyond 2028, when T-FSRP funding will end and the platform will become a lasting legacy of the program.

Phase 1: Pathway to Reach T-FSRP DLIs 2

Summary of DLIs 2 and current status of M-Kilimo Implementation

DLI 2 unfolds as:

- DLI 2.1: Rollout of five new service functionalities on M-Kilimo by FY 2024/25.
  Current Status (beginning FY 2025/26): The M-Kilimo app is mostly a mock-up; services, especially the weather component, are not yet integrate and functional.
- DLI 2.2: Training of 1,500 EOs (30% women) in FY 2024/25 and 2,500 EOs in FY 2025/26, toward a total of 4,000 trained.
  Current Status (beginning FY 2025/26): The extension department of the MoA stated that 6527 AEOs were already trained as of July 2025. However, trainings should be repeated once the M-Kilimo app is live to ensure that they will be able to access and use the new digital tool.
- DLI 2.3: Reaching 500,000 farmers (30% women) by FY 2025/26, and 1.5 million in total with e-extension services, either with early warning messages and/or submitted queries through the M-Kilimo.
  Current Status (beginning FY 2025/26): As the M-Kilimo app is not yet available to the public, the service has virtually no users yet.

FY 2025/26

Phase 1A: Stabilization and Core Launch of M-Kilimo digital services (app and SMS alerts)

1. Finalize and launch the weather information service:
- Integrate TMA API for daily weather updates
- Implement basic data visualization modules (icons, temperature, rainfall amount and probability)
- Operationalize early warning system for extreme events via the M-Kilimo app or via SMS

2. After the M-Kilimo is operational, soft launch of additional services.
We propose:
- Early Warning for pest/disease: integrate alerts from TARI, establishing SOP for fast communication, pivotal for timely alerts.
- Seasonal Production & GAP: upload static content (pdfs, texts) on Good Agricultural Practices for 3 major crops (e.g., maize, cassava, beans).

3. Performed AEO trainings focus on the weather component:
- Partner with TMA to conduct mandatory training for 1,500 EOs on using the M-Kilimo app, with a focus on interpreting and communicating the new weather service. Ensure 30% are women.

4. Start to bring user to M-Kilimo:
- Use the existing USSD/call center to push notifications to registered farmers, informing them of the new weather service.
- Equip trained EOs with a target to onboard 50 farmers each into the system (primarily via USSD queries), aiming for the first 75,000 active users.

FY 2026/27

Phase 1B: Scaling and Service Enhancement

5. Launch/enhance of all five service:
- Market prices: include in the app daily price data from major markets for 5 key crops.
- Digital recognition for pest: launch initial version, for instance as an image library, or as a form to repost pest to an AEO.
- Enhance weather information module: add seasonal outlook from TMA bulletins.

6. Scale AEO training and capacity:
- Train next 2500 AEOs (30% female), focusing on all five services and digital literacy.
- Establish a ToT program to create sustainable and recurrent internal training on M-Kilimo new functionalities and updates.

7. Launch a national awareness campaign:
- Partner with radio stations to broadcast weekly segments on M-Kilimo's weather and market advice.
- Run targeted SMS campaigns to the entire farmer database promoting the free USSD code.
- Leverage local government authorities to promote M-Kilimo at the village level.

FY 2027/28

Phase 1C: Sustainable Growth

8. Absorb user feedbacks and improve services:
- Collect structured user feedback and convert them into improvement points for both user experience and service content.
- Automate as many processes as possible, especially related to early warning, weather information and market prices.
- Formalize the process for updating the app content, such as the GAP and market information.

9. Reach 1.5 mln users and build PPP:
- Intensify Radio and SMS marketing
- Initiate B2B2C Pilots: onboard 2-3 agribusinesses (a seed company, an insurer) to bundle their services with M-Kilimo advisories. Their outreach efforts will directly contribute to new user acquisition.
- Analyze user data to understand what drives engagement and double down on those services.

Phase 2: The After T-FSRP, Pathway to Financial Sustainability

Shifting the Business Model

Based on available data, the experience of the writing partners, the local context, and insights gathered from interviews, we recommend that M-Kilimo adopt an hybrid model, combining public and private resources to ensure financial sustainability while delivering high-value services to farmers. By structuring revenue across multiple tiers, M-Kilimo can maintain a stable financial base, scale operations efficiently, and continue providing essential climate and agricultural advisory services to smallholder farmers.

Five layers of revenue to ensure financial stability are recommended:

- Tier 1: Public funding (government)
- Tier 2: Commercial bundling (business)
- Tier 3: Data sales (business)
- Tier 4: Climate finance (business/government) (optional)
- Tier 5: Data as Collateral (Emerging High-Value)

0-12 months

Phase 2A: Stabilization and Institutional Integration

The primary focus is establishing the institutional foundation and finalizing the core G2C services. Key actions include integrating the unified farmer registry fully with M-Kilimo and establishing the formal legal and policy framework for Public-Private Partnership, clearly defining terms for data sharing, liability, and revenue split. Crucially, the MoA must execute the regulatory pivot: stopping internal development of AEO logistics and establishing official certification and accreditation processes for private AEO service providers, such as MazaoHub. This phase relies heavily on Tier 1 (Public/Grant) funding.

12-36 months

Phase 2B: Commercial Pilot and Bundling

The goal of this phase is to validate the B2B2C revenue tiers. This involves piloting bundled services with a minimum of three distinct private partners (e.g., one input supplier, one index insurer, and one microfinance institution). The collective consent data governance policy must be fully implemented to manage Tier 3 revenue generation responsibly. The willingness-to-pay for premium, certified AEO services should be tested rigorously through certified private partners, generating the first scalable Tier 2 commissions.

36+ months

Phase 2C: Scaling and Climate Finance Integration

This final phase focuses on achieving self-sustainability and maximizing high-potential revenue streams. Successful B2B2C bundles must be scaled nationally. Concurrently, M-Kilimo must be officially rolled out as the national digital MRV platform for agricultural carbon projects (Tier 4), leveraging Tanzania's large potential in the Voluntary Carbon Market (VCM). Formal fee structures for both verified data insights (Tier 3) and MRV verification (Tier 4) must be finalized and implemented.

48+ months

Phase 2D: Data-as-Collateral Pilot

This advanced phase focuses on piloting the Tier 5 "Data as Collateral" model. This cannot be implemented until the legal and ethical foundations are secure. Key actions include establishing a clear legal framework for farmer data ownership, as this is currently ambiguous in the African region. M-Kilimo must first deploy "data wallets" that give farmers secure control and ownership of their individual data. Crucially, this phase must be preceded by intensive digital literacy and financial education campaigns to ensure farmers give true "informed consent". The pilot should begin with high-literacy farmer groups, bundling data-secured loans with the digital lockout enforcement mechanism as a last resort.

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Annex 5. CASE STUDY: AGRICULTURAL INFORMATION AND COMMUNICATION CENTER (CICA)

Summary

In 2010, Rwanda faced a challenge identical to the one M-Kilimo faces today: agricultural information was scattered, unverified, and difficult to access. Their initial solution, the Agricultural Information and Communication Center (CICA), failed to solve this because it functioned as a passive repository.

Rwanda's breakthrough came not from new technology, but from a radical structural pivot. They transformed the "Center" into a Program (AICP) embedded within the ministry's project engine, and they spun off the technology execution to a private partner (BK TecHouse). This case study analyzes that pivot to provide a roadmap for M-Kilimo's leadership structure.

1. Phase I: Passive Repository (2010–2015)

In 2010, the Ministry of Agriculture (MINAGRI) launched CICA with a mandate to "collect, store, and disseminate" information. It was designed as a central hub for all agricultural documentation. Despite the mandate, CICA struggled with the exact issue M-Kilimo faces: "getting information was a tall order".

- Siloed Operations: CICA stood apart from the actual agricultural projects. It had to request data from other departments, which often ignored it.
- Library Mentality: It functioned like a library, waiting for users to come to it, rather than an pro-active digital service.
- Lack of Leverage: It lacked the political teeth to force donor-funded projects (e.g., irrigation schemes) to share their internal data.

2. Phase II: The Structural Pivot to "AICP" (2016–Present)

The Strategic Shift: Recognizing that a "Center" was too passive, the Ministry restructured CICA into the Agricultural Information and Communication Program (AICP).

Key Governance Changes:

1. Instead of being a standalone unit, AICP was moved under the Single Project Implementation Unit (SPIU). In Rwanda, the SPIU controls the money and operations for all donor and government projects.
   - The Result: Suddenly, the information team had leverage. Sharing data with the central system became a compliance requirement for project funding, not a voluntary favor.
2. The "One Message" Policy (Thematic Working Groups): To stop the confusion of different NGOs giving different advice, Rwanda established Thematic Working Groups (TWGs).
   - The Mechanism: Scientists from the Rwanda Agriculture Board (RAB) meet in these groups to validate technical content. No digital message goes out unless the TWG approves it.
   - The Result: A "Single Source of Truth" that builds farmer trust.

Lesson for M-Kilimo: M-Kilimo must be positioned within the Ministry's central planning or project unit (like the SPIU) to mandate data interoperability across the sector.

3. Phase III: The Public-Private "Tech Engine" (2017–Present)

MINAGRI realized it could not hire or retain the "Engineering, Product, and Support Teams" required to run a commercial-grade platform like the Smart Nkunganire System (SNS) (the input subsidy digitization platform). Civil service pay scales and bureaucracy stifled agile software development.

The Solution: The "BK TecHouse" Partnership. Rwanda split the leadership functions into two distinct engines:

- **Engine A: Governance & Content (Government)**
  - Lead: MINAGRI / RAB / AICP.
  - Role: They define who gets a subsidy, what crops are promoted, and validate the agronomic advice.
  - Staff Profile: agronomists, policymakers, communication specialists.

- **Engine B: Product & Engineering (Private Sector)**
    - Lead: BK TecHouse (a subsidiary of the Bank of Kigali).
    - Role: They act as the "Agritech." They hire the software engineers, product managers, and UX designers. They maintain the code and run the call centers.
    - Business Model: They monetize the transaction flows (payments) to sustain the system, removing the burden from the Ministry's budget.

Lesson for M-Kilimo: M-Kilimo should not try to build an internal "Engineering Department" inside the government. It should govern the platform but contract a specialized private entity (the "Agritech Partner") to execute the engineering, product, and support functions.

4. Applied Recommendations: The M-Kilimo "borrowed" Structure

Based on the CICA/AICP evolution, M-Kilimo should adopt this specific leadership hierarchy:

A. The Strategic Level (The "M-Kilimo Program")

- Location: Embedded within the Ministry's Planning/SPIU.
- Leadership: Program Director (Government appointee with Tech background).
- Role:
    - Enforces data sharing from all agricultural stakeholders.
    - Chairs the "Digital Content TWG" to validate all advisory tips.
    - Holds the contract/SLA with the private technology partner.

B. The Execution Level (The "Agritech Partner")

- Location: Private Sector (Contracted via PPP).
- Leadership: Product CEO (Private sector hire with Fintech/Agritech experience).
- Departments (as requested):
    - Engineering Team: dedicated to 99.9% uptime and API integrations.
    - Product Team: focused on user research (UI/UX) for farmers.
    - Business Development: focused on signing up banks and insurers (Tier 2 revenue).
    - Support Team: managing the call center and "Village Digital Agents" (VIDAs).

C. The Field Level (The "Twigire" Model)

- Structure: M-Kilimo Village Agents (Volunteers/Commission-based).
- Role: Borrowing from Rwanda's Twigire Muhinzi, these agents are not just government extension workers but incentivized "digital promoters" who help farmers register and troubleshoot the app.

GLOBAL
CENTER ON
ADAPTATION

ANTOINE PLATEKADE 1006
3072 ME ROTTERDAM
THE NETHERLANDS
+31(0)88-088-6800
WWW.GCA.ORG