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Enhancing climate adaptation through the digital connectors model for agricultural extension in Uganda

Authors: Joshua Sikhu Okonya (ASARECA), Bashir BenBella (AFAAS), and Kwaku Dei Antwi (FARA)

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POLICY BRIEF

Enhancing climate adaptation through the digital connectors model for agricultural extension in Uganda

Key Messages

- The current public extension worker-to-farmer ratio of 1:1800 in Uganda is severely inadequate to support the uptake of knowledge-intensive Climate Smart Technologies, Innovations, Management Practices, and Services (TIMPS)
- Face-to-face training of farmers by community-based personnel with the use of digital tools, specifically smart and feature phones, significantly increases both access to and demand for climate-smart TIMPS.
- The low utilisation of digital solutions, especially tools involving pre-payments for inputs/services or non-instant payments for delivered farm produce, is partly due to fear caused by a lack of trust among off-takers or suppliers.

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- The absence of clear Return-on-Investment (ROI) models for extension service provision contributes to low public and private funding.
- Reluctance by farmers to pay for extension services is attributable to the non-commercial nature of the farming enterprise, the low profitability of the farmed commodity, or market uncertainty.
- The provision of a 5% commission by input companies to youth digital connectors for goods marketed via digital platforms sustains the onboarding and utilisation of these platforms by women and youth farmers, thereby increasing reach even in rural areas.
- Supportive policies, including subsidies on products such as weather-index-based agricultural insurance or solar-powered irrigation systems, substantially increase the utilisation of climate-smart TIMPS

Introduction and Context

Climate change poses a significant threat to agricultural productivity in Uganda. As of 2024, 3.5 million households were still engaged in subsistence agriculture, and 5.3 million young people were classified as Not in Employment, Education, or Training (NEET). These educated youth as well often face unemployment or under employment, despite owning smartphones and being tech-savvy.

To increase the commercialisation and competitiveness of Uganda's agricultural sector, it is imperative to address the triple burden of youth unemployment, the acute shortage of extension workers, and climate change. This deficit limits the full contribution of the youth to the country's GDP and hinders the attainment of targets under Uganda's Agro-Industrialisation Programme, enshrined in the National Development Plan IV (NDP IV).

Public agricultural extension systems in Uganda, as elsewhere in sub-Saharan Africa, suffer from limited coverage, outdated methods, and under-resourced agencies. Traditional extension agents are often too few, and their messages are too generic to address the diverse needs of modern farmers. Access to quality public extension services remains limited for the 89% of Ugandan farmers who are responsible for 80% of the country's agricultural output. The extension worker-to-farmer ratio is estimated at approximately 1:1,800, which is substantially higher than the FAO-recommended ratio of 1:500. This clearly reflects a significant shortage of formal extension personnel across the country.

To complement the current public extension system, there is a necessity to embrace a pluralistic approach to extension service provision. This approach as of necessity and based the current proliferation of new technologies should include the use of digital tools and the establishment and/or strengthening of private community-based extension service providers who act as farmer service intermediaries.

The project aimed to enhance the capacities of youth and women in agricultural extension and advisory services to improve the accessibility, relevance, and effectiveness of information for farmers in the Luwero and Bugiri districts. It further created employment opportunities through the delivery of farmer-paid extension and advisory services.

Results from the Digital Connectors for Farming Communities (DC4FC) supported by the "Strengthening Agricultural Knowledge and Innovation Ecosystem for Inclusive Rural Transformation & Livelihood in Eastern Africa (AIRTEA)" initiative provides evidence that demonstrates how the public extension systems have been complemented by the digitally enabled youth agripreneures by providing personalized climate-smart advisories on technologies, innovation, and management practices (TIMPS) such oil testing, packaging, drought-tolerant seed varieties, weather-index insurance, and digital market linkage. This dramatic evidence reinforces the call for pluralistic digital AEAS model in the National Planning.



Case Study: Youth-Led Digital Connectors in Uganda

2.1. The AIRTEA Project Intervention

Our experience from implementing the "AIRTEA project in Uganda—which trained and supported the establishment of nine digital connectors—demonstrates that digital agriculture platforms offer promising solutions to increase productivity, build resilience to climate shocks, reduce the cost of extension, increase household income, create jobs for youth, and improve decision-making among farmers. However, limited awareness of and access to these tools currently hinder their widespread adoption.

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2.2. The Digital Connector Model

A digital connector is defined as a community-based, trained professional (with a certificate, diploma, or bachelor's degree in agriculture) who is tech-savvy, lives in rural areas, and is involved in some form of agribusiness within their community.

These nine youth agripreneurs were trained and mentored for at least three months by value chain business experts at designated innovation hubs[31]. They were supported with seed capital to buy ICT



equipment (e.g., tablets or smartphones) to keep customer records digitally, expand their markets, and reach more smallholder farmers with agricultural advisory, agro-inputs, or market information.

The connectors currently provide services to nearly 10,000 members belonging to two cooperatives: the Zirobwe Agaliawamu Agri-Business Training Association (ZAABTA) Innovation Platform (IP) in Luweero District, and the Bugiri Agribusiness and Institutions Development Association (BAIDA) Innovation Platform in Bugiri District, involving all actors along the commodity value chain. The integration of Digital Connectors into these innovation platforms has promoted transparency, improved trust and facilitated the onboarding of farmers threby providing evidence that sustained digital services scale faster when embedded in local/community-level structures.

2.3. Digital Service Portfolio and Platform Usage

The digital connectors primarily use WhatsApp groups to market their products and services and to buy farm produce from farmers, with some also using Android applications. This strategy has created a platform for efficient communication and transactions, facilitating market access and ensuring a fairer and more efficient exchange of agricultural products.

Key extension services provided include:

- Subsidised weather-indexed crop and livestock insurance through the *M-Omulimisa* platform.
- Subsidised solar-powered irrigation systems and equipment, such as solar panels.
- Improved climate-resilient seeds (drought-tolerant, high-yielding, quick-maturing varieties).
- Soil testing services and fertiliser recommendations through the *virtual agronomist* platform.
- Shared agricultural machinery (e.g., tractor hire services) through the *agrishare* app.
- Post-harvest handling services (e.g., drying facilities, packing bags, and tarpaulins).
- Sustainable pest management products such as Aflasafe, biochar and organic fertilizers.
- Training in Good Agricultural Practices, farm planning, and field establishment.
- Aggregation and sale/marketing of farm produce (e.g., rabbit meat).

Key Lessons and Barriers to Scaling

To increase the utilisation of digital tools by farmers, the following lessons and barriers were identified:

3.1. Lessons for Service Delivery

- **Trust and Moderation:** The moderation and coordination of multistakeholder innovation platforms by not-for-profit organisations is key to building trust among value chain actors trading (buying and selling) via digital tools.
- **User-Friendly Design:** WhatsApp-based platforms are popular and user-friendly, even for innovation platform members who cannot read or write, as they support video and audio messages in any language.
- **Commercial Viability:** Contract farming or an assured off-take market increases production. Furthermore, access to real-time market price information improves negotiation skills and better decision-making, resulting in improved household income.
- **Community led structures** such as innovation platforms act as transparency and trust accelerators. Farmers adopt digital technologies faster when the extensionist operate within the innovation platforms. Similarly, evidence from the DC4FC project demonstrate that behavioural change strengthens when digital technologies are tied to tangible economic benefits such as reduced cost, better prices and pay-outs.
- **Youth Engagement:** Engagement of youth to provide low-cost, community-based extension services on a commercial basis creates jobs, attracts youth to agriculture, and reduces the current low extension worker-to-farming household ratio of 1:1,800.

3.2. Identified Barriers

- **Financial Trust:** The low utilisation of digital solutions is significantly influenced by models involving pre-payments or non-instant payments, due to a lack of trust.
- **Farmer Commercialisation:** Farmers' reluctance to pay for services is partly due to the non-commercial nature of their enterprises, low profitability of the farmed commodity, or market uncertainty.
- **Contract Breach:** Some individual farmers fail to honour off-take contracts, particularly when prevailing market prices exceed the pre-agreed contract prices.

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Policy Recommendations

Based on the experiences and lessons learned, we propose the following policy actions to accelerate the sustainable scaling of youth-led digital extension services:

Policy Area	Specific Recommendation	Rationale and Impact
Digital Literacy & Access	Invest in improving access to short, community-based adult learning courses from vocational institutes at the certificate level, specifically targeting women and individuals over 35 years.	Improving literacy levels will stimulate and improve farmer information-seeking behaviour and utilisation rates.
	Facilitate the provision of both basic and internet-enabled smartphones to farmers on contract or credit, allowing payment over 1-2 years.	Increased access to mobile phones is essential to avoid disempowering those who cannot afford them and is key to ensuring access to digital information.
	Embedding the Digital Connectors in the government programs and initiatives as accredited community-level digital AEAS providers such as Uganda's Parish Development Model (PDM)	Strengthened last-mile extension delivery by trained rural youths thus creating jobs, improving farmer decision-making, and increasing adoption of TIMPs
	Embedding the Digital Connectors in the government programs and initiatives as accredited community-level digital AEAS providers such as Uganda's Parish Development Model (PDM)	Strengthened last-mile extension delivery by trained rural youths thus creating jobs, improving farmer decision-making, and increasing adoption of TIMPs
Infrastructure & Cost	Increase coverage of rural areas with mobile and internet access by telecom service providers through targeted investment in infrastructure.	Reliable internet access enhances adherence to agricultural production protocols.
	Develop products that reduce the cost of internet mobile broadband and bandwidth. This can be achieved through **zero-rating** websites and mobile apps that provide agricultural information to farmers in rural areas.	Affordability is a major determinant of service utilisation.
	Create/strengthen existing AEAS national shared digital content repository (video, audio, PDF) that can be distributed via USSD, WhatsApp, and community radios to lower cost.	Improved access to verified relevant climate-smart information for farmers and DC, reducing information costs and dramatically expanding farmers reach by the DCs.

Policy Area	Specific Recommendation	Rationale and Impact
Commercial Models	Support the development of clear Return-on-Investment (ROI) models for private extension service provision to justify and increase public funding.	The absence of clear ROI models contributes to low public funding.
	Provide incubation, mentorship, and seed capital as catalytic funding to youth innovators developing ICT-based extension tools. Formalising off-take arrangements increases farmer motivation toward digital services.	Formalisation, combined with funding and mentorship from African institutions like FARA, ASARECA, and AFAAS, is essential for enabling Youth-Led Agritech Startups to grow and ensures production commitment.
Regulatory & Policy Support	Offer favourable tax regimes/incentives to private companies investing in the development of digital agriculture tools and platforms.	This will stimulate private sector participation and investment in much-needed infrastructure and platform development.
	Accreditation of youth Digital Connector: Formalize the digital AEAS model in MAAIF/UFAAS to professionalize and regulate community-based digital extension providers.	Enhanced trust and improved service quality that enables DCs to work formally with district governments, cooperatives, and private agritech actors

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Correspondence: j.okonya@asareca.org



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Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)
Plot 5, Mpigi Road | P. O. Box 765, Entebbe, Uganda
Tel: +256 414 698 259
Email: secretariat@asareca.org | Website: www.asareca.org
@asareca | asareca@facebook.com | @ASARECA_ECA