Tokyo International Conference for African Development (TICAD9) Official Side Event Webinar

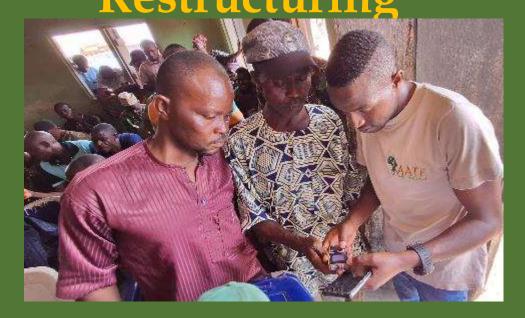
Scaling Agricultural Extension in Africa amid Emerging Technologies and Global Aid Shifts

Held on Thursday, July 24th by 16:00 (Japan time)

Speakers' Presentation Materials (in order of presentation)

1. Keynote Address Presented by Dr. Emmanuel Okogbenin, Product Development and Commercialization Director AATF

Reimagining Agricultural Extension in Africa in the Era of AI and Global Aid Restructuring



A Keynote Address at TICAD9 Webinar

Presented by: Dr. Emmanuel Okogbenin,

Product Development and Commercialization Director AATF



Outline

Introduction

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Status of Agricultural Extension in Africa

Emerging Technologies Shaping the Future

Key Enablers to Scaling Al-Driven Agricultural Extension

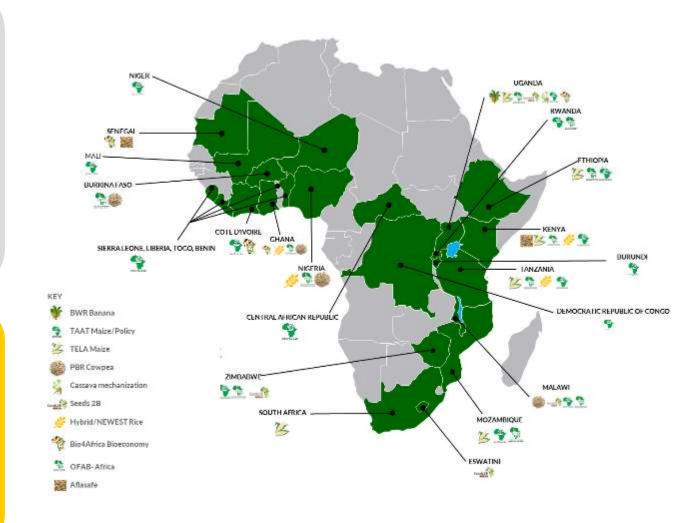
Immediate Changes needed in the Extension Landscape

AATF: Who we are

Emerging **powerhouse** in **Agricultural technology** deployment

- ✓ Empowering farmers across Africa
- ✓ Presenting a wide **choice of agricultural innovations**
- ✓ Contributing to food and nutrition security

We believe that the farmers in Africa will become globally competitive through use of the best technology, optimal agricultural practices, strategic product value addition and boosted access to efficient markets within and outside Africa



Three Strategic Objectives for Delivery of AATF Strategy

SO1:Diverify Agricultural
Technologies & Expand
Frontiers for next-gen
Products in Africa

SO2:Accelerate commercialisation and scaling of agricultural technologies in Africa

SO3:Promote creation of a functional enabling environment for increased uptake of agricultural technologies and efficient markets in Africa

The strategic objectives will be implemented taking into account four cross-cutting priorities (CCPs)

CCP1: Improve climate change resilience among farmers in Africa

CCP2: Enhance access to resources, agribusiness opportunities, and technology for women and youth

CCP3: Improved Nutrition of African Farmers and Consumers

CCP3: Build knowledge and foster evidence-based decision making

AATF's Unique Roles and Interventions

Technology Transfer

Acquisition

- IP Management & Patented Technologies
- Innovative Technologies

Management

- Adaption
- Testing
- Validation

Delivery

- Stewardship
- Deployment
- Scaling
- Technical Backstopping

Through PPP



Commercial Agriculture

- Appropriate use of technology
- Improved uptake
- Increased adoption

CAADP/SDGs

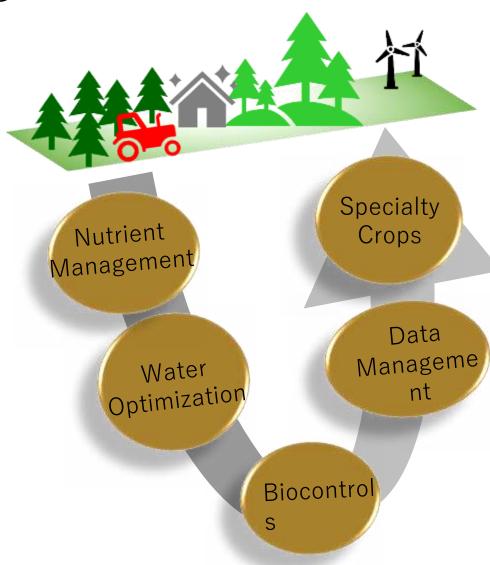
- Food Nutrition security
- Poverty Alleviation
- Improved livelihoods

Enabling Environment Systems

- Sustainable best production Practices
- Technology knowledge systems (Awareness creation)
- Input systems (Seeds, fertilizers, pesticides etc)
- Seeds systems
- ❖ Agro-service provision (e.g mechanization)
- Policies & Harmonization
- Regulatory systems
- Market systems
- Advocacy (Political will)

Key Issues Facing Africa's Agricultural Sector

- Low agricultural productivity despite abundant arable land
- Over-reliance on rain-fed agriculture vulnerable to climate shocks
- Degraded soils and declining land fertility
- Weak market access and value chains for smallholder farmers
- Inadequate rural infrastructure roads, irrigation, cold storage
- Limited access to quality inputs seeds, fertilizers, equipment
- Aging farming population with poor youth participation
- Low public and private investment in agriculture.
- Weak policy frameworks and implementation.
- Poor integration of research, innovation, and farmers



Status of Agricultural Extension in Africa

- Extension systems are overstretched and outdated
- Tech exists but doesn't reach last-mile farmers
- Climate change and aid restructuring demand new approaches
- AATF is bridging this gap with innovation

Key Challenges:

- Traditional models often lacked scalability, inclusivity, and responsiveness *gender and youth exclusion from services*
- Low extension-to-farmer ratios: 1 agent:3,000+ farmers
- Limited investment: poor infrastructures and aging extension workforce
- Fragmented programs and inconsistent funding
- One-size-fits-all approaches that ignore local realities
- Analog systems slow information delivery, disconnected feedback loop leading to knowledge gaps
- Limited training and capacity of extension workers



To truly transform African agriculture, we must evolve our extension systems from analog and fragmented to intelligent, datadriven, and AI-enabled."

Changing Landscape of Agricultural Extension— A New Reality

- Rising demands for real-time, data-informed, and farmer-centric extension models
- Need for innovative approach of financing Extension services (blended finance, PPPs) -Stronger alignment with national development goals
- Socioeconomic transformation: rising youth population, increasing demand for sustainable agriculture, and expanding value chains
- Local ownership and sustainability are no longer optional—they're essential to ensure sustainability



Emerging Technologies Shaping the Future

Emerging Solutions:

- Al-powered advisory platforms (e.g., weather, pest detection, yield modelling).
- Big data analytics for personalized farming recommendations market and crop predictions
- Satellite imagery, Drones, sensors and remote diagnostics real-time field monitoring and advisory services to farmers
- Chatbots and USSD platforms for last-mile outreach
- Smart mobile and cloud-based platforms
- Blockchain for traceability and inclusion to improve transparency, trust, and participation in agricultural value chains

Case Examples:

- Hello Tractor (Nigeria): Predictive analytics for tractor services
- AATF Climate smart weather stations *integrates ground* sensors with satellite data) for advisory to improve productivity in the face of climate change
- Agridrive App cassava mechanization and processing advisory support to farmers improving productivity and access to processing and market

Benefits:

- Scalability and cost-efficiency
- Real-time, localized, adaptive extension
- Empowerment of digitally literate youth

Key Enablers to Scaling Al-Driven Agricultural Extension

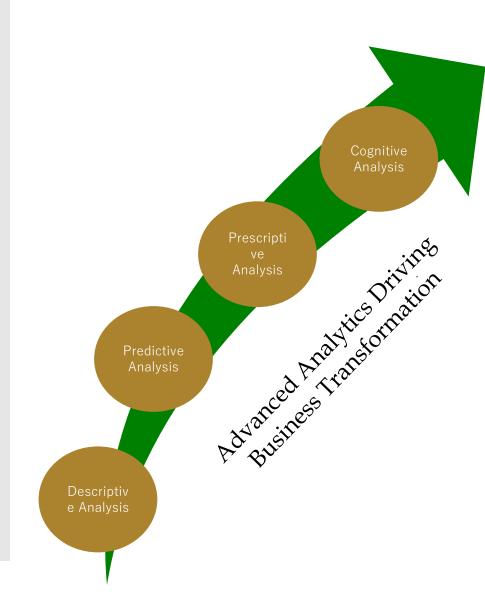
- Digital Infrastructure
 - Rural internet, mobile, and energy access
- Farmer-Centric Design of Accessible Al Tools
 - Community-sourced, indigenous knowledge
 - Feedback loops for continuous learning
 - multilingual Interactive Voice Response (IVR) and Short Message Service (SMS)
 Local languages, low-literacy interfaces
- Capacity Building
 - Al/digital literacy for farmers & agents
- Policy & Regulation
 - Ethical data use, digital infrastructure, PPPs
 - Government involvement and creating enabling environment is critical
- Institutional Collaboration
 - Gov't, NGOs, research, startups synergy
- Sustainable Financing
 - Donor, gov't, private sector investments





Immediate Changes needed in the African Agricultural Extension Landscape

- Migrate from analog to intelligent systems
 powered by data, AI, and connectivity
- Transform subsistence to commercial farming promoting value chains and entrepreneurship
- Connect isolated farmers through digital platforms, networks, and markets
- Shift from blanket advice to precision guidance tailored to each farmer's context
- Replace male-dominated with inclusive systems empowering women and youth
- Advance from reactive to proactive services
 leveraging predictive tools and real-time information
- Change fragmented service delivery to integrated ecosystems *uniting research, innovation, and policy*



To truly transform African agriculture, we must evolve our extension services from analog and fragmented systems to intelligent, data-driven, and AI-enabled



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2. Special Report
Presented by Dr. Eliot Jones-Garcia,
Natural Resources & Resilience Unit
IFPRI



Harnessing AI to Scale Agricultural Extension: Opportunities and Emerging Pathways

Eliot Jones-Garcia | Natural Resources & Resilience Unit IFPRI | 24 July 2025



Generative AI in Agriculture

Generative AI learns from massive datasets to produce humanlike responses—text, images, or code—tailored to user questions.













Opportunities for Extension

Scalable access to advisory services

GenAl can provide 24/7 support to farmers who are underserved by human extension systems.

Localized, language-sensitive responses

GenAl can be fine-tuned to local languages and agronomic practices.

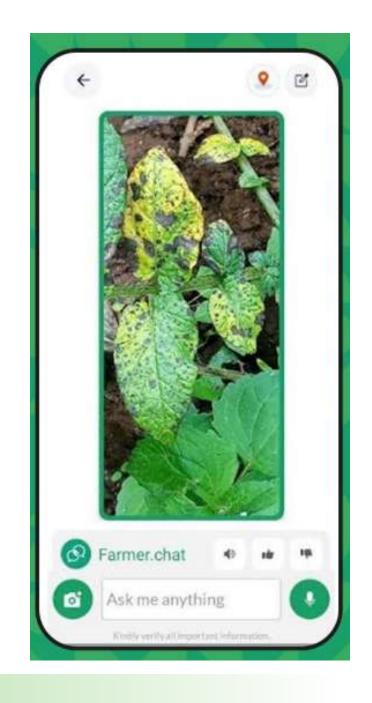
Improved knowledge access and continuity

GenAl can recall previous interactions and personalize recommendations over time.

Cost-effective and rapid deployment

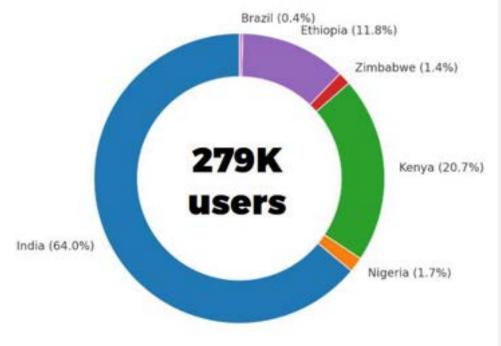
Once trained, GenAl can be deployed widely with minimal additional infrastructure.

Sources: Tzachor, 2023; Sia, 2024



Insights from Deployment

Farmer.Chat Highlights



*Data as of June 20, 2025

compart on the public with Austral Mount of the color

~3 Million

Queries asked on Farmer.Chat

27% women

(currently 21% unknown)

28% MAU

Monthly active use Across key geographies

14X growth

In 9 months [Oct-Jun] 18.5 Queries

Per user/ in month of June

~89% farmers

11% Extension Agent & others

36% WAU/MAU

monthly active users returning weekly

7000 Queries

New in Farmer.Chat every day (June)





What We're Learning from the Field

Voice matters

Women and marginalized farmers ask questions they wouldn't ask a person

Built on WhatsApp

Familiar platform improves accessibility and trust

Trust is earned

Farmers validate advice on small plots, then share it

Continuous learning

Feedback loops from call logs and ratings shape ongoing updates



Challenges: Why Scale Alone Isn't Enough

Limited contextual data

Gaps in local, machine-readable ag knowledge

Risk of harm

Misinformation from poor training data or lack of validation

Decision-making gap

Models don't reflect how farmers choose under real-world constraints





Designing the Next Generation of Al-Enabled Extension

Data innovation

Use farmer queries to surface and fill knowledge gaps

Human-centered design

Align reasoning models with how farmers think and decide

Language inclusion

Expand support for low-resource languages and dialects

Stress-testing

Red-team models to uncover failure points and unexpected uses





Thank you!

Eliot Jones-Garcia
Senior Research Analyst
Natural Resources & Resilience Unit
International Food Policy Research Institute
e.jones-garcia@cgiar.org



2. Status and Future of Extension in Africa
Presented by Dr. Kristin Davis,
Natural Resources & Resilience Unit
IFPRI



Sustaining and scaling multidimensional and digital agricultural extension in Africa

Kristin Davis | Natural Resources & Resilience Unit IFPRI | 24 July 2025



Scaling and Sustainability

- Expanding impact of a project or program to greater levels
- 3 important dimensions to scaling:
 - o impact benefits many people
 - system change
 - sustainability

Basic Scaling Lessons*

- Change mindsets to think of scaling as a process
- Context matters scaling depends on enabling environment and actor dynamics
- Scaling is not linear; it happens in phases; different skills, capacities, networks are required to navigate through each phase
- Scaling is not always good

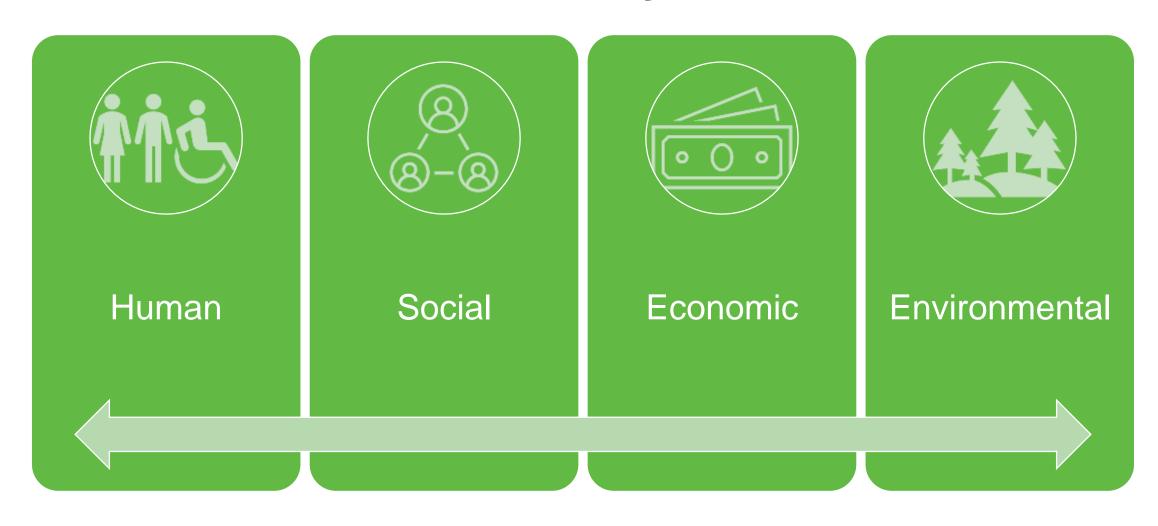


Program Sustainability

- Continuation of a program within an organization
- Ability to maintain program outcomes and benefits
- Capacity built to continue the program



4 Pillars of Sustainability



Source: RMIT University 2017



Additional Considerations

- Investment in science and data
- Climate resilience
- Gender equality and social inclusion
- Acceleration of innovation uptake
- Innovative financing models
- Partnerships for impact; multisectoralism



Thank you!

Dr Kristin Davis
Senior Research Fellow
Natural Resources & Resilience Unit
International Food Policy Research Institute
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4. Multidimensional extension: experience and lessons
Presented by Dr. Rosemirta Birungi,
Africa-wide Technical Lead, AFAAS

Tokyo International Conference for African Development (TICAD 9)







Strengthening Agricultural Extension in Africa through continental initiatives and local innovations

Online Official Side Event: Scaling Agricultural Extension in Africa amid Emerging Technologies and Global Aid Shifts

Dr. Rosemirta Birungi (PhD Agric. Value Chain Extension)

Title: Africa-wide Technical Lead, AFAAS

Date: 24th July, 2025













Context of Africa's Agriculture



Daunting Challenges to Africa's Agriculture Extension Landscape

- Weak Extension Systems -in terms of effective and cost-effective extension for context-specific KITS (Knowledge, Innovations, Technologies & Services) to farmers and other Agricultural Value Chain actors/agents-this is worsened by increasing costs of extension, including Time Poverty & Digitalised Extension (Soft & Hardware Digital infrastructure).
- Low Investment in Africa's Agricultural TREDAGS (Trade, Research, Education, Development Agencies, & Governments)—the situation is worsened by the shifts in Global Financing Mechanisms that are getting more competitive.
- Complex and Changing Agrarian Landscape of Africa's Agriculture- worsened by shrinking agricultural land, inverted demographics (more youth), climate-induced migrations (humans, livestock & farming systems); wide extension agent-to-farmer ratio 1:3,000 1:10,000 (against the FAO recommendation 1:500 in response to UN SGD Indicator 2.a Target 14).



Impact of Challenges to Africa's Agriculture Extension Landscape

- Continuous low productivity, low profitability & natural resource deterioration of farming systems in African countries
- Low and reduced attractive funding for Africa's Agriculture priorities
- Replacement of Agriculture as a core source of livelihoods, especially for Rural Households in Africa.
- Re-location of Production Resources to alternatives use-e.g. Land relocation to Industrial/Manufacturing, Rear Earth Mineral Extraction, Housing, e.t.c.

Africa's Local Solution Initiatives /Innovations to Strengthen Agriculture Extension

• Archetypes for Last-mile AEAS delivery- these are Institutional Mechanisms for strengthening extension systems, digitilization, and private sector engagement/investment in Agriculture. AFAAS/AGRA On-going support

(e.g., Rwanda Customized Agriculture Extension Services (CAES); Burkina Faso (under designing)

• Pluralist Extension Models – Comprising Public & Private Sector, NGOs, Farmer Organisations, Development Agencies, e.t.c. Pluralistic Agricultural Extension Services (PAES) have the potential to overcome constraints related to funding, staffing, and expertise, and to make advisory services more demand-driven.

e.g., Last-mile Delivery Models for Africa's Agriculture Investment AFAAS/AGRA profiled

• Ideology of "Silos-No-More" - Africa Extension Coalition that involves AEAS Institutions that are oriented to Africa's Agricultural Development and Investment Promotion.

i.e., A shift of Africa's Agriculture Extension from a Pathetic Service to an Attractive Investment sector

(e.g., AFAAS, Sasakawa, AGRA, One Acre Fund, UN FAO, IFAD, Virginia Tech. Univ, & CGIAR, + more TBD)



Take-Aways/Recommendations for Strengthening Africa's Agricultural Extension

- Institutional Alignment- to enable uptake of innovative transformative Initiatives/Solutions e.g. Pluralistic and Business Models for Agric. Extension
- <u>Shift in Perception Orientation</u> of Africa's Agriculture-<u>from Pathetic Sector that</u> <u>"requires support" to a Domain that attracts Investment</u>
- Pay attention to Demographic transformations in Africa's agricultural context-Youth innovativeness, Women Entrepreneurship, <u>Shortened Extension</u>
 Pathways, Digital Extension Solutions
- Reformulate Agricultural Research and Analytics to rightly inform Agriculture Extension in Africa (for Policy. Planning, Practice, Education, Trade, e.t.c)



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5. Multidimensional extension: experience and lessons Presented by Mr. Anyang Robert Tabot, Country Director. SAA-Uganda



A Success Story of a Pluralistic Agricultural Extension Model in Uganda

Presenter: Anyang Robert Tabot Country Director. SAA-Uganda

Walking with the farmer



The significant gap in farmer-extension worker ratios impacting agricultural productivity

STATUS OF EXTENSION IN AFRICA (2024)

Countries	≈ No of extensions Personnel (2024)	Number Employed in Agriculture (Millions)	Agriculture as a % of National Total Employment	Extension Personnel to Farmer Ratio
Ethiopia	≈ 72,000	33	66	1:458
Uganda	5,000	9.75	65	1:1950
Nigeria	7,000-10,000	40	35	1:4000
Mali	800-1,200	5.44	68	1:4530
Malawi	1,8000-2,379	4.27	61	1:1795
Mozambique	1,000-1,500	8.4	70	1:5600
Morocco	1,800-1,500	4.62	33	1:3080
Kenya	4,000-5,000	7.6	40	1:1520
Egypt	2,000-3,000	7.5	25	1:2500
South Africa	2,000-2,500	0.8	5	1:320

Recommended Rate: I Extension Worker: ≈ 500 farmers



Issues of accessibility faced by farmers regarding inputs, markets, and finance

Access Challenges Overview:

Farmers in Uganda often struggle with limited access to essential agricultural inputs, affecting their production capabilities and market engagement.

Financial Accessibility Concerns:

Many farmers find it difficult to secure financing options, which are crucial for investing in productivity-enhancing technologies and practices.

Market Access Barriers:

Barriers such as inadequate transportation and unreliable market information further prevent farmers from maximizing their income potential.

Strategies for Enhancing Accessibility:

Implementing digital platforms and partnerships with financial institutions can significantly improve farmers' access to resources and markets.



Overview of Uganda's pluralistic agricultural extension framework for diverse farmer needs.



Pluralistic Extension Landscape

The Ugandan agricultural extension framework incorporates public, NGO, and private sector actors, promoting a collaborative approach to meet diverse farmer needs.



National Agricultural Policy

The 2016 National Agricultural Extension Policy establishes a comprehensive framework supporting pluralistic extension to enhance agricultural productivity.



Collaborative Framework

This model fosters collaboration across various sectors to address farmers' diverse requirements and improve agricultural services.





The Concept of CCBF –Last mile production and marketing services delivery for Smallholders farmers

What if every rural community had a one-stop service agent farmers could trust and afford?

All you need to do is invest \$8 per farmer over two years...And the model sustains itself

The CCBF becomes a self-reliant, income-generating rural extension provider.

- Farmers gain reliable access to inputs, markets, and advisory services.
- ✓ Local ecosystems thrive from trust-based, business-driven delivery.
- High ROI. Low risk. Real impact.



By working with Local Government Extension Workers and NGOs, each Commercial Community-Based Facilitator (CCBF) can sustainably serve up to 200 farmers—redefining lastmile delivery with a ratio of 1:200.



Who the CCBF Is and How It Works

- A local, trained, and mentored rural agri-preneur
- Selected with community and market actor input
- Trained in NSA, RA, PHM, agribusiness, digital tools
- What they offer (Combo Services):
- Inputs, mechanization, PHM, bulking, finance, digital tools
- Embedded in Cooperatives/OSCAs, linked to SAA, government, private sector





Description of the CCBF model focusing on community-based facilitators and their roles.



Role of CCBFs

Commercial community-based facilitators, trained in agronomy and business, serve as rural agripreneurs offering bundled services to farmers.

Service Delivery Model

The CCBF model enables facilitators to provide essential services, enhancing productivity and market integration for farmers.



Training and Resources

Facilitators receive training on key agricultural practices and are equipped with tools and digital resources for effective service delivery.

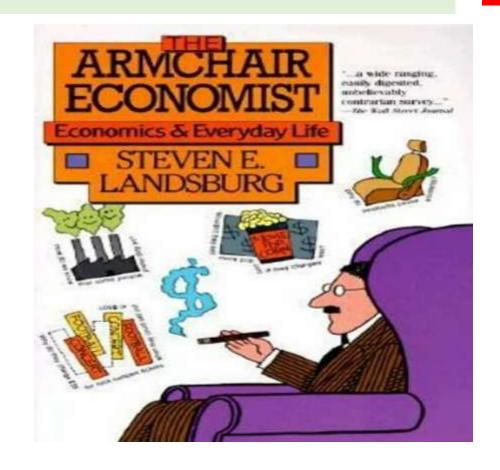


Incentives that Work: Combo service delivery

Incentivizing CCBFs to deliver affordable door-to-door extension services to farmers

Combo services is a set of 4-5 services from pre production to marketing that enabling's a CCBF to work approximately 185 days a year

Targeting \$42 per farmer/year commission
Serving 100–250 farmers = \$3,000–\$6,000/year



"People respond to incentives. All the rest is commentary." – Steven E. Landsburg



Incentives That Drive Impact: Combo service approach

Combo Services	Services Offered	Profit(USD) generated /Yearly(Estimate based on farmers served)			
		100	200	300	400
сомво 1	Soil testing, input sales, planting, weeding, spraying	3,041	6,082	9,123	12,164
сомво 2	Digital profiling soil testing, input sales, planting, weeding/spraying	2,364	4,729	7,093	9,458
сомво з	Input sales, planting, weeding, spraying & Bulking agent	5,004	10,008	15,012	20,017
сомво 4	Crop insurance, input sales planting, weeding & bulking agent	2,907	5,815	8,722	11,629
сомво 5	Soil testing/Crop insurance Weeding shelling, bulking,	3,982	7,963	11,945	15,927
сомво 6	Digital profiling, crop insurance, spraying, bulking, shelling	3,645	7,289	10,934	14,579
сомво 7	Digital profiling, , spraying, shelling, bulking digital financial services	3,695	7,390	11,086	14,781
COMBO 8-gende led	rDigital profiling, crop insurance, bulking, drying, cleaning, shelling, digital financial services	4,685	9,371	14,056	18,742



The Three Amigos -Public -Private -SAA partnership

Local Government
(Public Sector):
Provides technical
mentorship, extension
oversight, and alignment
with national
agricultural policy.

Sasakawa Africa Association (SAA):
Acts as the catalyst identifying, onboarding, and training CCBFs while brokering partnerships and facilitating capacity-building.

Private Sector Actors:
Supply quality inputs,
mechanization services,
digital tools, and
structured market access
through partnerships with
CCBFs.

- Jointly Mobilize Ecosystem Partners: Bring in financial institutions, seed companies, processors, NGOs, and digital innovators to embed their services through the CCBF model.
- Create a Vibrant Rural Service Economy: CCBFs become trusted local hubs for last-mile delivery—driven by incentives, backed by institutions, and trusted by farmers

Expanded market, lower distribution cost,

Higher seed uptake, demand forecasting,

Greater reach, reduced fraud, bundled

Better client profiling, loan recovery, rural

Consistent quality supply, aggregation, and

Wider extension coverage, better policy

Stronger services, member engagement, and

trusted product delivery

offerings increase uptake

delivery, real-time data

farmer education

portfolio growth

traceability

What's In It for Them? Motivations Behind Ecosystem

Support for CCBFs"				
Stakeholder	Key Hidden Cost Without CCBFs	Value from CCBF I		
Farmers	High input cost, low yields, poor market access	Increased yields, lower costs market access and incomes		

Limited demo reach, poor seed replacement

Coverage gap, poor reporting, low adoption

Service failure, weak member engagement

Costly distribution, low uptake, brand

Poor enrollment, fraud risk, costly

dilution

rates

mobilization

Investment ts, improved

Financial Institutions Risky clients, high due diligence, low coverage Poor quality supply, inconsistent sourcing **Processors**

Private Companies

Seed Companies

Insurance Firms

Government

Cooperatives

CCBF as a sustainable business model for rural communities in









Innovative Service Models for Farmers

The CCBF model provides a reliable service agent for farmers, focusing on trust and affordability, ensuring sustainable agricultural practices in rural Uganda.

Transforming Last-Mile Delivery

Last-mile delivery in agriculture is redefined, transitioning from charity to a sustainable business model, supporting rural communities.

Community Engagement and Trust

Trust is built through local presence, with trained agripreneurs actively engaging and providing essential services to farmers.

Diverse Service Offerings

Combination of services including input supply, soil testing, mechanization, and digital advisory, tailored to meet farmers' comprehensive needs.

Yield Improvement Metrics

Training programs have led to yield increases of 40-70%, significantly enhancing farmer productivity and income.

Community Engagement

CCBFs, trusted agripreneurs, effectively engage local farmers, resulting in better farming practices and sustainable agricultural growth.



720 CCBFs trained, impacting 102,000 farmers across 26 districts in Uganda

Training Success Rate

A total of 720 Community-Based Facilitators (CCBFs) have been trained, in partnership with government PDM significantly enhancing agricultural extension services across Uganda.

Geographic Diversity

Implementation of the CCBF model spans 26 districts, demonstrating its adaptability to various agricultural contexts throughout Uganda.



Farmer Outreach

The program successfully reached 92,000 farmers, showcasing the extensive impact of the CCBF model on local agricultural practices.



Community Impact

Active engagement with local communities has built trust, leading to improved adoption of agricultural practices among farmers.







THANK YOU

......Walk with the Farmers







6. Multidimensional extension: experience and lessons Presented by Dr. Tawanda Mthintwa Hove, Senior Program Officer, Digital Agronomy, Gates Foundation

The Impact of Digital Agricultural Technologies and Innovation and the Public-Private Partnership (PPP) on Empowering Smallholder Farmers

Gates Foundation

TICAD9 SAA WEBINAR July 24thrd, 2025 Tawanda Hove







Digital advisory services





30% (10-70%)





23% (0-75%)



Digital market linkages



37% (15-100%)



73% (5-300%)



Digital financial services



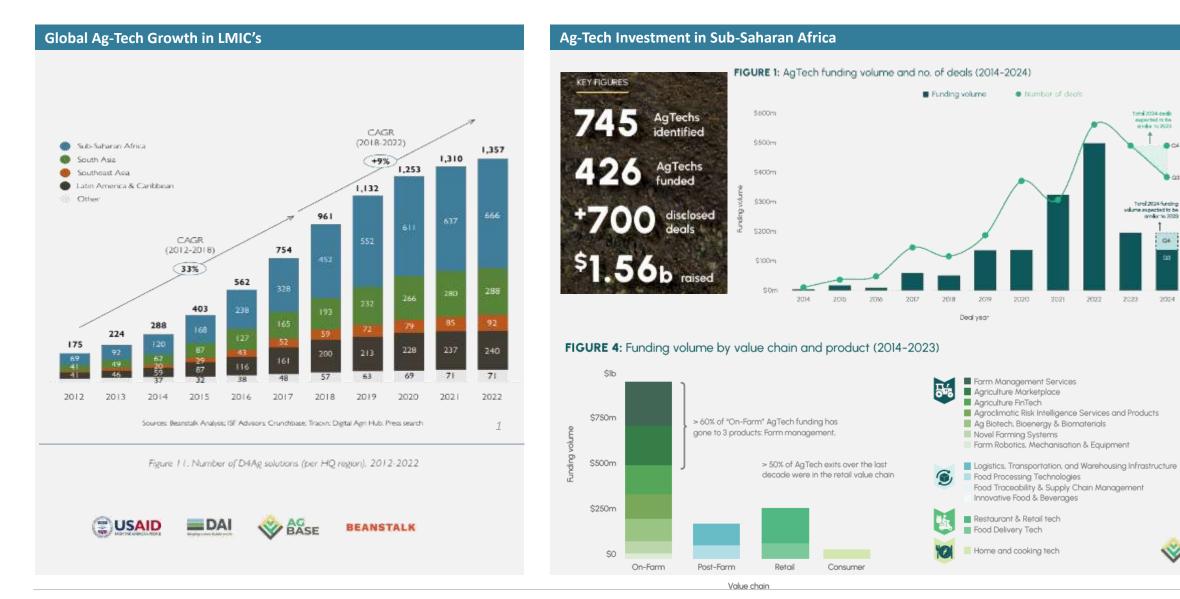
18% (16-20%)



38% (25-50%)

13 August 2025 1. 2019. CTA. Digitalization of African Agriculture © Bill & Melinda Gates Foundation

Digital farmer services have scaled but investment growth has stalled



^{1.} Beanstalk AgTech. 2023. State of the Digital Agriculture Sector. Harnessing the Potential of Digital for Impact Across Agricultural Value Chains in Low- and Middle-Income Countries. 2. AgFunder. 2023. Africa AgriFoodTech Investment Report

Number of deals

2020

2021

Total 2004 decis similar to 2023

Total 2024 funding

similar to 2023

120

Digital Farmer Services Reach: Status and Targets across India and Africa

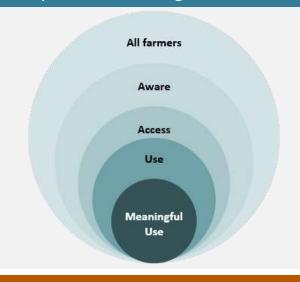
India 2024 Reach¹ Projected 2030 Reach¹ **Relevant Impact Examples** # reached vs total SSP pop. # reached vs total SSP pop. Odisha (6.5M of 7.5M) **Odisha** (7M of 7.8M) Ama Krushi RCT in Odisha (preliminary) for 2021-22 Season Benefit-cost ratio of 14:1 Higher incomes for farmers of 31% women, 3.5K agents 35% women, 7K agents ~\$61/farmer/year due to advisory on high rainfall events Bihar (17.7M of 19.7M) Bihar (<1M of 17.9M) 8.5-10% increase in rice yield for farmers impacted by heavy <5% rainfall (which was 27% of farmers) 60% women, 12.2K agents 20% women, 11.5K agents Reduction in cost of services at scale from \$0.37/farmer/year at **UP** (1.6M of 23M) **UP** (22M of 24.4M) 2.7M farmers to \$0.18/farmer/year at 6.9M 6.9% farmers **Early Results from Virtual Assistants** 23% women, 10K agents 21% women, 6.5K agents Kisan Mitra AI in UP reports 72% **DPI as DPGs** India: DPI & AI accuracy of 120 chatbot AgriStack, VISTAAR & AI Agristack, VISTAAR responses as scored by experts solutions deployed across & Al Pilots in 6 states India & in SSA

Africa 2024 Reach¹ Projected 2030 Reach¹ **Relevant Impact Examples** # reached vs total SSP pop. # reached vs total SSP pop. Kenya (4.8M of 7.8M) Kenya (7.4M of 8.1M) **Kenya Digital Climate Informed Advisory Service** survey shows greater resilience to pest and disease 62% due to weather driven advisory 47% women, 6K agents 49% women, 22K agents Kenya AgriFin Digital Farmer ADF reaching 2.2M farmers (47% women) Ethiopia (6.8M of 37.5M) **Ethiopia** (13.1M of 40M) across 34 ag-techs registered. 1.7M active with 40% report increase in 33% 18% income and productivity 27% women, 60K agents 38% women, 64K agents Digital Green Telegram chatbot in Ethiopia incorporates NextGen site Nigeria (2.6M of 28.4M) Nigeria (10.3 of 33.5M) specific fertilizer advisory shown to increase wheat grain yield by up to 31% 9% 25% iSDA Virtual Agronomist Co-Pilot 32% women, 6.5K agents 31% women, 7.5K agents shows 3 to 4-fold yield and profit Africa: DPI & AI DPI as DPG's increases with sunflower, maize, and Design & deployment of Farmer Registries in Nigeria, sorghum under good management Farmer Registries in Ethiopia Ethiopia and Kenya plus and Kenya other required India DPI's

We have more evidence however reach and impact are still low globally

Reach: While much has been invested in digital farmer services, active use is relatively low and meaningful reach is lower still

	Sub-Saharan Africa	South Asia	Southeast Asia	Latin America and the Caribbean
No. of agri workers (USDA ERS)	202,769,129	252,831,323	96,671,241	38,798,551
Estimated proportion of active users (% of people employed in agriculture)	5%	10%	6%	17%
Estimated # of active users	10,876,687	26,498,311	6,152,794	6,621,297
Estimated # smallholder farmers 7	~ 190 million ⁸	~ 180 million *	~ 100 million 10	~ 15 million ¹¹



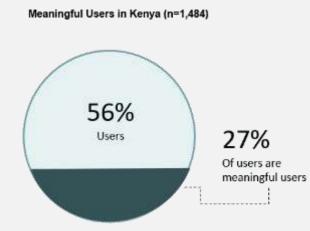
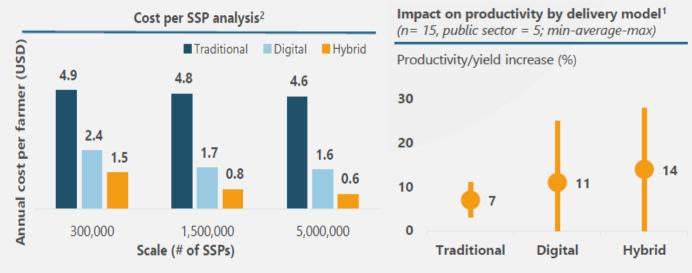


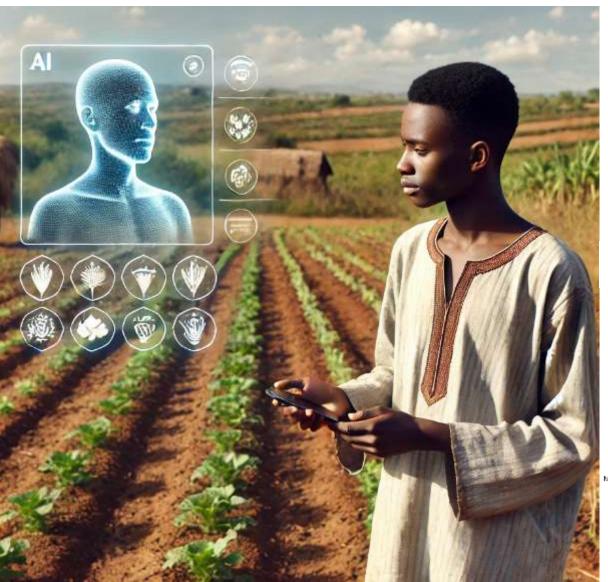
Table 2. Current State of Reach and Adoption in LMICs

Evidence Synthesis³: Barriers to adoption remain digital literacy, language literacy, relevance of information, awareness and cost. Hybrid services perform better

- 10% improved adoption of seeds
- 23% increase adoption of fertilizer
- 6% increase in yield (13 studies: range: -11% to 68%)
- 6% increase in incomes (9 studies: range: 0%-53%)
- Gender gaps persist with 26% of users being female
- Cost of digital advisory extension services is lower than in-person extension @ \$0.18 to \$2.40 per farmer per season
- Hybrid (i.e. digitally enabled agents) have twice the impact, though ratios of agent to farmers remain low (most 1:1000 to 1:2000K)

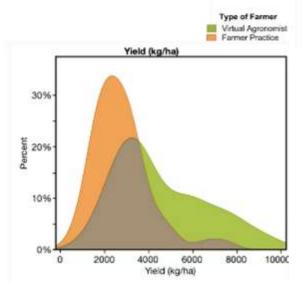


Early results from personalized AI advisory are promising



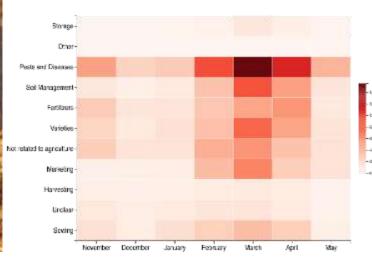


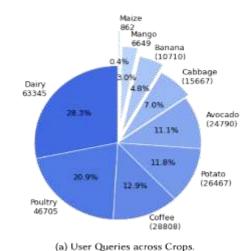
Deployed across 20K plots, 5 countries, 5 crops. Uganda maize farmers saw an average increase in yield of 66% or 1.8t/ha. 48% achieved high yields of at least 4t/ha, versus 10% using typical practices.



Digital Green

Deployed across 15K farmers, 5 countries and 6 languages, 40 crops. **75% of questions were successfully answered** and can be analyzed in near real-time.





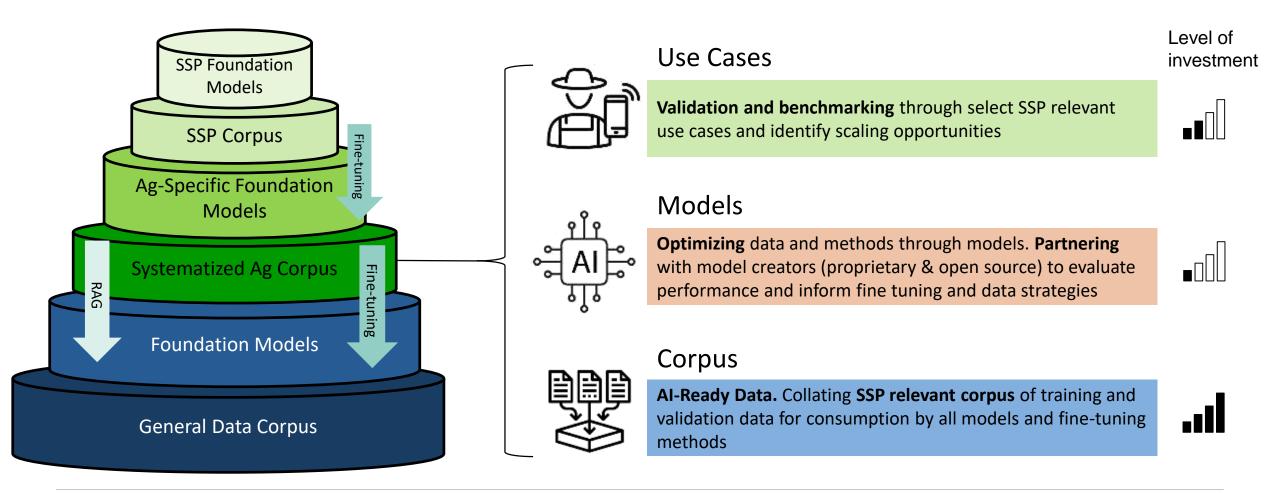
^{1.2024.} Image: ChatGPT4o. Prompt: Please generate an image of a smallholder farmer in Africa using a virtual AI assistant for advice

^{2.2024.} Internal report from iSDA to BMGF

^{3 2024.} Digital Green & Microsoft Paper. 2024. Farmer Chat: Scaling Al-Powered Agricultural Services for Smallholder Farmers

Our investment strategy has been a focus on Corpus and Validation

Development of Foundation Models (FMs) is limited to a handful of big-tech organizations due to cost and pace of innovation, though open source FMs are emerging. Open datasets with LMIC relevant data would enable fine-tuning or augmentation of FMs to benefit small scale producers, though questions remain as to data requirements, effective fine-tuning methods and future FM landscape (size, cost, domain specificity).





We are testing AI advisory to supplement physical extension agents

	dynAg	Digital Green & Partners	Viamo & Partners	Tech For Her	
	IFFCO KISAN IRRI	GOOEY.AI Digital Green	Sahaj PRODUCERS	DeHaat Dalberg	
Cohort		Constitution and Consti	Alto Pringramin		
Where?	Bihar	Bihar and Kenya	Bihar and Kenya	Bihar and Kenya	
Value Chains	Rice, Weat, Maize	Dairy, chicken, coffee, potato, avocado, cabbage, banana, mango, poultry, wheat	Beans, sweet potatoes in Kenya, Wheat, rice in Bihar	Tomato in Bihar, Cattle in Kenya	
Channels	Chatbot/App (Android, Jio based), IVR (via ASR and TTS), SMS	App, Telegram (transitioned to app), IVR	Voice hotline/IVR, SMS, WhatsApp	IVR, WhatsApp, App	
Technology	Retrieval Augmented Generation (RAG) Pipeline based on LLMs (GPT suite so far), machine translation to translate queries, speech technology (recognition and synthesis)	Retrieval Augmented Generation (RAG) Pipeline based on LLMs (evaluation of various models), machine translation to translate queries, speech technology (recognition and synthesis), image recognition, weather data	Retrieval Augmented Generation (RAG) pipeline based on LLMs (focus: GPT), query classification, machine translation to translate queries, speech technology (recognition and synthesis) enabled IVR	Intent and entity recognition through LLM for chatbot, speech technology (recognition and synthesis) enabled IVR, AI-based video generation	
Languages	English, Hindi	English, Hindi, Swahili, Gikuyu, Bhojpuri	English, Hindi, Swahili	English, Hindi, Swahili, Bhojpuri	
User reach	300	13 000	600	150	

There are existing initiatives to aggregate and federate advisory content

Yet these have not yet gained traction, significant scale or are still in early stage of development



Generative Artificial Intelligence for Agriculture (GAIA)

Content Aggregation: Expand the advisory corpus developed in GAIA Phase I, which includes 45,000 CGIAR publications. IFPRI will continue to secure access to relevant content from new partners, including FAO, Agricultural Ministries of India, Ethiopia, and Kenya.

Data and AI governance: Lessons around content licensing and improving access and sharing from GAIA Phase I will be used to ensure that content sharing is done efficiently, but also with adequate transparency and attribution around content sources to induce trust in Gen AI models.

Dynamic Advisories: To improve Al-generated advisories for small-scale producers, GAIA will integrate various dynamic models (e.g., process-based, machine learning, reasoning) and incorporate real-time data like weather forecasts and soil information.

Evaluation and Benchmarking: GAIA will assess LLM tools' performance in agricultural extension services, focusing on accuracy, timeliness, gender-sensitivity, and contextualization. The project team will develop standardized benchmarking data, methods, and protocols to ensure consistent and reliable evaluation metrics.

OpenAgriNet (OAN)

OpenAgriNet (OAN) is a global network dedicated to transforming agriculture through Digital Public Infrastructure (DPI) and AI—powered solutions. By uniting governments, innovators, and farmer facing organizations around agricultural advisory content and knowledge, we aim to revolutionize agricultural practices worldwide, driving sustainability and inclusivity in the sector.



Open Data sets



Tools and reference code





Specifications and standards

https://openagrinet.global/

And there are many other AI chatbots and voice bots emerging

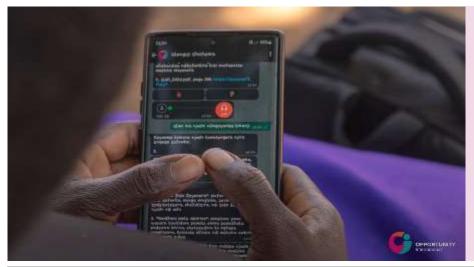
Yet many are challenged to build technically robust AI, GenAI and LLM solutions with their own resources and have limited depth



Mzee.ai was created by a game company using animated Avatars to represent different types of advisors that farmers may be able to relate to



Governments
like Odisha
quickly
launched Al
Advisors to
demonstrate
they are
providing value
to constituent
farmers

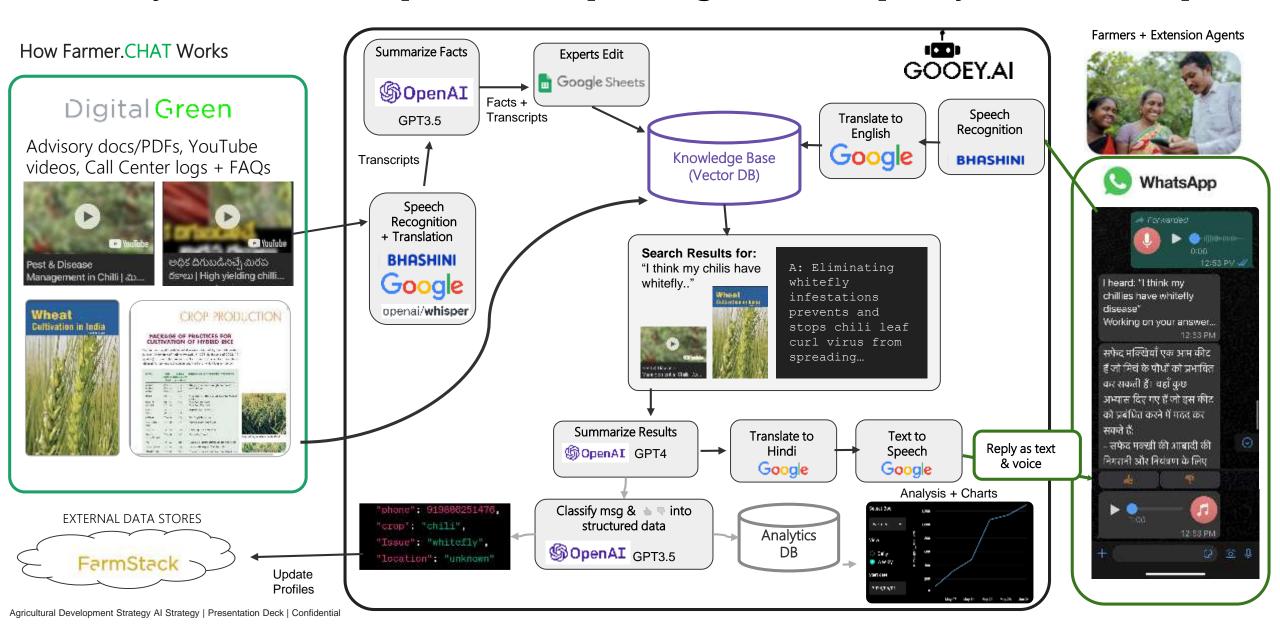


NGO's like Opportunity International are leveraging Al pipelines to enhance their farmer facing services – such as financial inclusion tools

Al investment in AgTech Startups gains traction in number of deals, but not volume

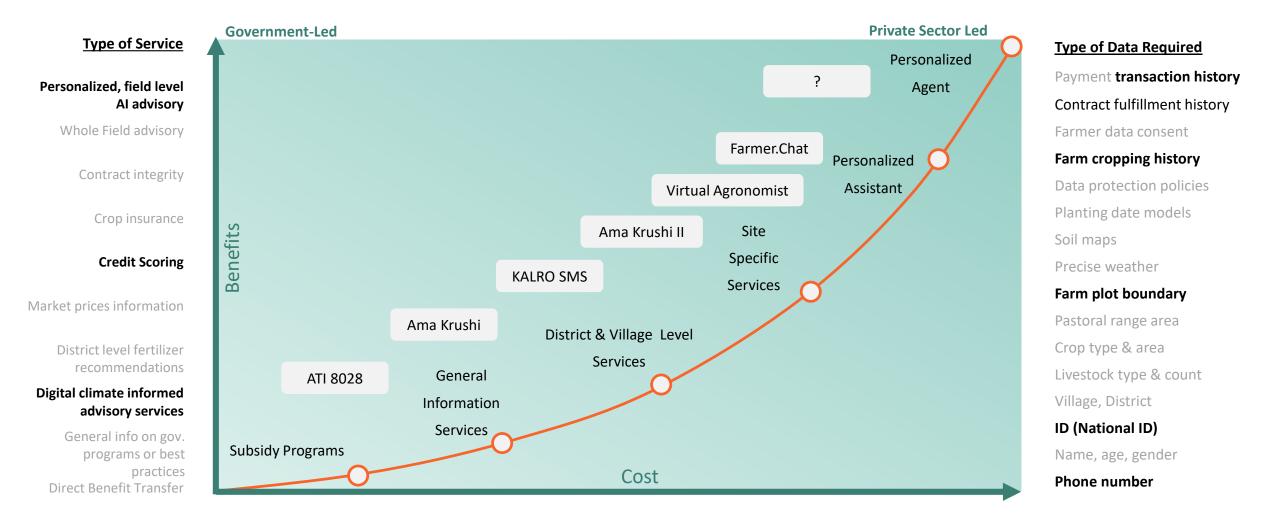
The last year has seen a big increase with AI-related deals growing from 9% to 15%, but funding volume has been limited. The majority of these deals over the last twelve months have been at the very early-stage, accounting for less than 1% of the total funding to AgTechs over this period.

Gen AI systems are complex and require significant capacity and data corpus



Increased value can be derived with more farm and farmer data

As you increase the amount of data known about a farmer and their assets, the greater the cost, but the greater the benefits



We have started developing a taxonomy for on-demand, personalized advisory

Our hypothesis is small-scale producers with access to personalized AI advisory can significantly increase productivity & incomes at scale

Extension Service Provision Agri-Business Research Farmer "What if" What if input suppliers and What if researchers could What if all SSPs had unlimited What if extension agents and What if Gov. & Private sector off-takers could track SSP receive real-time information access to on-demand. advisors could reach 10x can sustainably provide **Scenarios** personalized, advisory? advisory < 0.10c/farmer/year? demand & supply real-time? on farmers needs? more farmers? **ICT Advisory Tools AI Advisory Tools** Information ICT **Virtual AI Agents Apps** ChatBots **AI Assistants** Real-Time Feedback **Delivery** USSD, SMS, IVR Geo-based advice Native voice and text LLM based interfaces Autonomous advisors To service providers & research & Exchange DPI **Fine-Tuning of AI Models** Farmer Identification **Agricultural Content Corpus Protocols and Standards** Farm Location Registries & ID Land record, geo-code For LLM Content Embeddings for Agriculture for Federated Data Sharing **Building Blocks** Soils **Pest and Disease** Weather **Crop Health Markets Agronomy Content** DPG's & Soil nutrient maps & High quality short & Alerts of to inform Real-time and forecast Earth observation Research backed prevention and services long-term forecast derived crop market prices climate adaptive **Data Services** treatment analytics practices **Enablers** Voice & Lang. Corpus Other Services (Finance, Insurance, Input Supply) National ID Compute **Data Policy**

Importance of PPPs in empowering smallholder farmers

Moving to transformative impact

13 August 2025



- Data is the new currency for scale and we cannot achieve it without a united front
- Digital public infrastructure is facilitated by government to enable private sector to innovate
- New revenue and cost recovery models are needed and PPPs offer a solution
- Duplication can only be addressed when you have conglomerating partnerships.



How DPI can benefit SSPs

Identify and enroll

Unique IDs & registries

- National ID
- Digital farmer registries
- Public registries (plot, crop, etc.) using same farm/farmer ID

Payments

Unified payment infrastructure

- Direct benefit transfers
 & subsidy payments
- Input supply payments and credit
- Offtaker payments

Digital credentialing

Secure, Interoperable data infrastructure

- eKYC: contract history tracker, credit history, alternative credit score, contract integrity
 - Consent management for SSP data
 - Asset verification: land, irrigation, soil health, livestock, carbon credit certification
 - Regulatory compliance: quality grade certification, regulatory compliance, proof of animal vaccination, etc.

Broadcast and fulfill

Market discovery of small-scale producer products

- Platform-agnostic protocols for all market participants to broadcast info about products and services or discover collaborators
- Market fulfilment protocols

Tailored services

Open data about farmers and farms enable tailored services and enable AI advisors

- Digital farmer profiles that include farmer location and farm field boundaries
- Data exchange to enable farmers to share their data with public and private sector service providers
- Tailored services like credit, insurance, advisory, input supply and market offtake
- Advisory networks to access climate smart advisory content for integration into AI agents











Who is a Farmer?
If someone is a Farmer?

What Crop has the Farmer Grown? How much area have they grown?

What plots do they own? Where are the plot?



A global network for agricultural knowledge and resources

Ag Research

Agribusiness

Finance

Advisors



7. Panel discussion
Presented by Dr. Junji Koide,
Senior Researcher, JIRCAS

Data-Driven Decision Support for Scaling Farmer-Centered Technologies in African Extension Systems

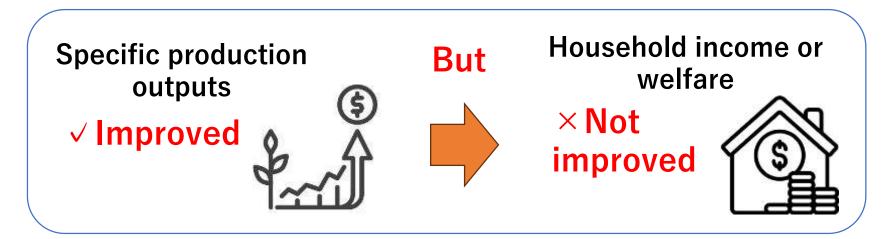
Japan International Research Center for Agricultural Sciences (JIRCAS)

Junji Koide

TICAD9 Official Side Event Webinar July 24, 2025

~ Background ~ Have farmers truly benefited from extension services as expected?

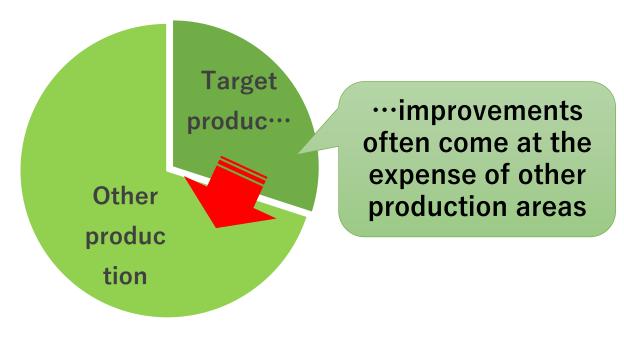
A widely-observed finding from empirical studies on agricultural technology and policy impacts in Africa



e.g., ISFM (Adolwa et al., 2019), SRI (Takahashi & Barrett 2014), SHEP (Shimizutani et al., 2021), Subsidized fertilizer (Jayne et al., 2018), Microfinance (Van Rooyen et al., 2012)

Why is the overall impact limited?

A farmer's resource allocation



···We need to address the **trade-offs** farmers face when allocating limited resources across different production areas.

Resource allocation strategies vary significantly from farmer to farmer.

An example of tailored decision support

We developed a model that determines the optimal croptechnology mix that enhances food security and maximizes profit, tailored to each farmer's available resources, preferences, and performance.

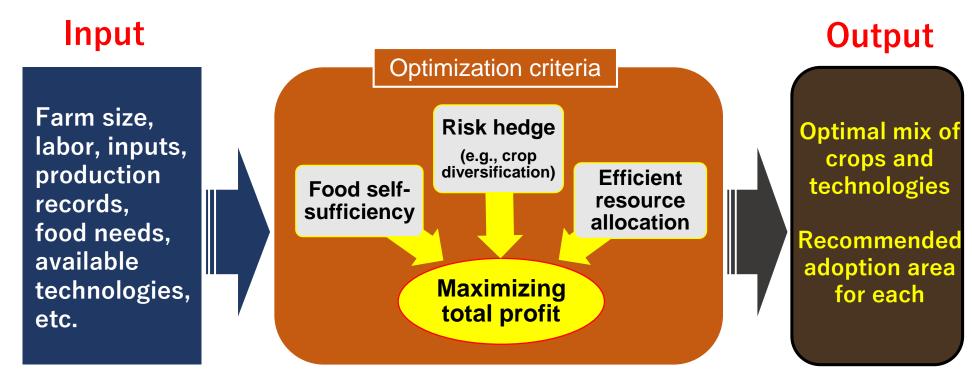
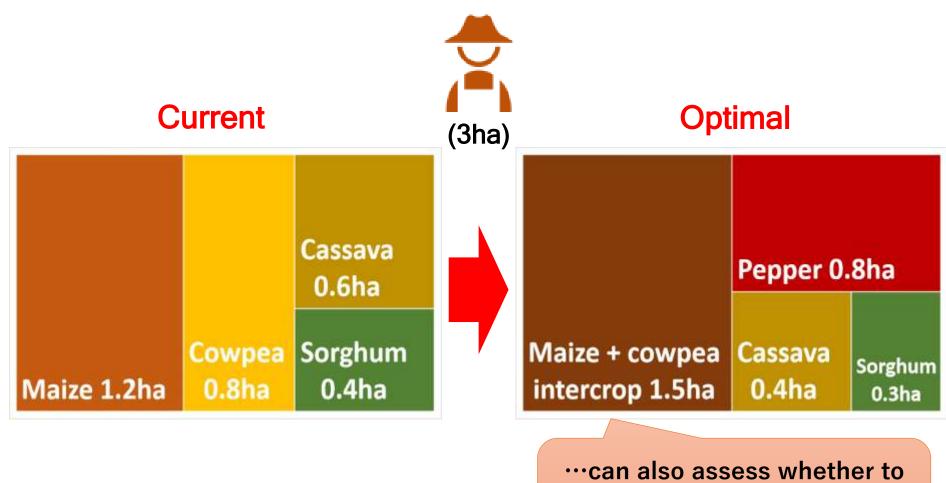


Image of model output (An example)



...can also assess whether to adopt alternative technologies (e.g., intercropping with legumes)

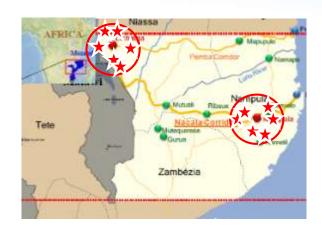
Model application in Mozambique

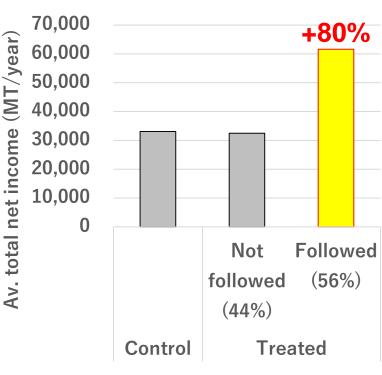
Impact assessment based on a randomized-controlled trial

Treated (n=130)	Received a tailored farm solution created by model
Control (n=130)	Not received the solution









Scaling model-based decision support

Applying the model in practice is costly, as it requires visiting each farmer, collecting data, running the model, and delivering results back to them.



Development of a user-friendly application that enables farmers to complete the entire process—from data input to optimal solution output—on their own.







Prospects for data-driven decision support

While farmers can make better decisions using their own knowledge, the impact of decision support can be significantly enhanced by incorporating additional data and insights from development agencies, extension services, and research institutions.



A collaboration meeting with SAA local staff

Therefore, promoting collaboration among these stakeholders, alongside the digitalization of decision support tools, offers great promise for building extension systems that truly benefit farmers.

8. Panel discussion
Presented by Ms. Yenenesh Egu Bezabih,
Lead Executive Officer, Agriculture and Horticulture
Extension, Ministry of Agriculture Ethiopia



Overview of The Ethiopian Extension System



Contents

4





Key Policy and Strategic Emphasis

Agricultrure Extension Advisory Service in Ethiopia

SWOT Analysis of Extension in Ethiopia

Pluralistic Agricultural Extension and Service

1. Overview of Ethiopia's Agricultural Sector



- Primary Livelihood: A major source of livelihood for approximately 80% of the population.
- **6** Economic Engine:
 - Contributes significantly to the national GDP: 32% in 2022 (AfDB) and 34.9% in 2024 (NBE)
 - Accounts for 80% of the nation's exports.
- Major Employer:
 - Employs about 75% of the country's workforce.
- **1** Land & Production (2024/25):
 - Total cultivated farmland: 31.6 Million Hectares.
 - Horticulture accounts for over 1.15 Million Hectares and 4.6% of total agricultural income.

Sector Transformation:

The sector is undergoing rapid transformation, driven by: Digitalization, Mechanization, Irrigation

Overview...



However, agricultural productivity is very low due to various factors:

- Subsistence smallholder dominance
 - ► ~12 million households, contributing to 95% of crop production Low external input use
 - ► Limited use of fertilizers, improved seeds, and agrochemicals
- The Environmental degradation
 - Soil erosion, deforestation, and loss of biodiversity
- Climate change & variability
 - ► Frequent droughts, floods, and recurrent shocks
- Pests and diseases
 - ► Threatening both crops and livestock Land fragmentation
 - Small, scattered plots hinder mechanization and efficiency
- Institutional constraints
 - Weak market integration and limited extension service coordination



2. Key Policy and Strategy Emphasis



Major focus areas (2021-2030)

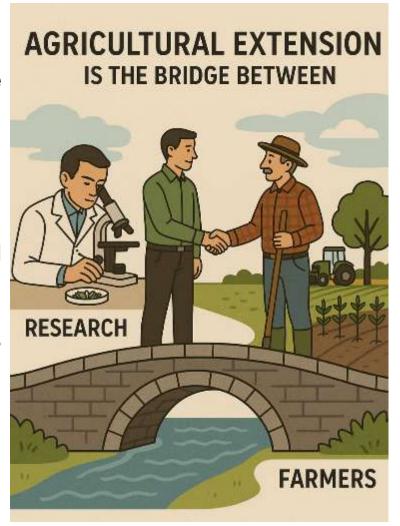
- Irrigated agriculture
- 2. Agricultural mechanization services
- Contract farming, cluster approach and land consolidation
- Livestock development, animal feed & health services
- Horticulture development (irrigation & urban farming)
- 6. Engaging private sector
- 7. Implementation capacity
- Climate resilient sustainable agricultural development



3. Agricultural Extensionand Advisory Service in Ethiopia



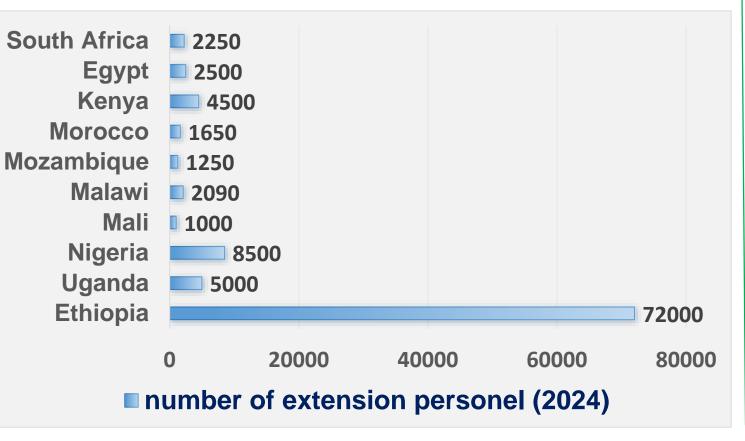
- Agricultural extension serves as a crucial bridge between research and farmers, facilitating the transfer of knowledge and innovative solutions.
- These services empower farmers to adopt new techniques and practices, ultimately improving their livelihoods,
- Agricultural extension system comprises various actors and stakeholders which among others include public, private, civil societies, NGOs, development partners, and farmers organizations,
- So far, the public institutions play dominant role in Ethiopia

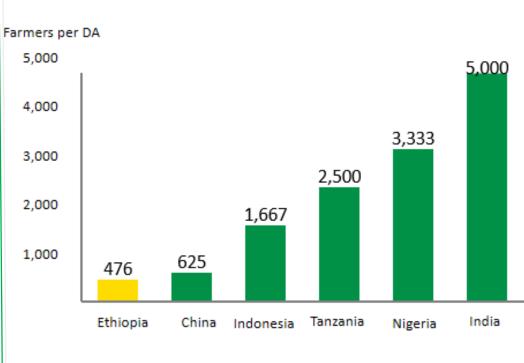


Agricultural Extension System of Ethiopia...



Staffing and Facilities: Staffing compared to some other African Nations



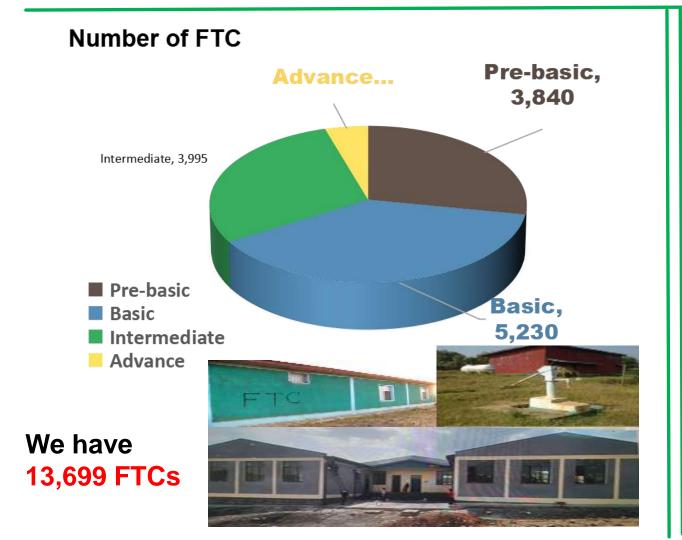


Farmers per DA

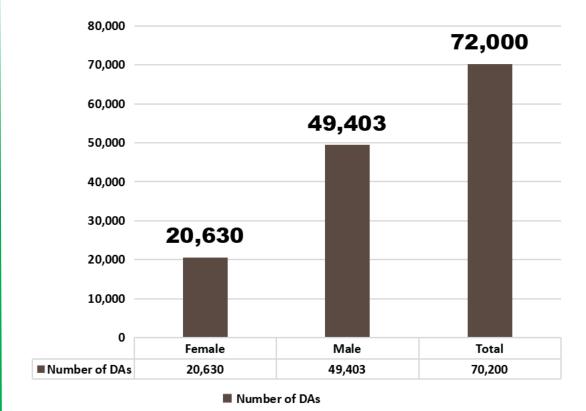
Agricultural Extension System of Ethiopia...



Staffing and Facilities: Number of FTC and Development Agents



Number of DAs



Recent Key Initiatives

Going Digital in Agricultural Extension System





Develop digital solutions



Conduct capacity building programs



- Digital capacitation standards
- Established a stakeholder's platform for digital

agricultural extension

- DA registry
- Farmer call center
- Digital studio
- Agri. Innovation Hub
- ✓ Ag telegram ChatBot
- ✓ Farmer Registry
- **✓** SmartFarming

- Capacitating FTCs through digitalization
- ✓ ToT on digital literacy training
- Develop videos based on GAP for the extension and advisory service



Today, we are at a key milestone of digitalizing our agriculture extension and advisory services

4. SWOT Analysis of Extension in Ethiopia





- Decentralized and well-structured extension system
- ✓ Deployment of large number of Development Agents
- ✓ Increased demands by farmers for improved technologies
- ✓ Establishment of agricultural training institutions (ATVETs, FTCS)
- ✓ Smallholder oriented extension service
- Limited resources and funding for extension.
- Accessibility issues in remote areas.
- lack of a continuous capacity development program
- Climate change impacts affecting agricultural practices.
- Weak coordination and linkage among actors Limited use of digital extension and advisory service
- Minimum involvement of the private sector

SWOT Analysis



- Conducive policy and strategy and high commitment of government
- Emerging agro-processing industries for value chain development
- Existence and growth of farmer cooperatives and unions
- Existence of HLI and ATVETs to train extension agents in agriculture
- Existence of different potential extension service providers



- ☆ High turnover of experienced professionals,
- ☆ Limited technology availability
- rice fluctuations on input and output market,
- Climate change and recurrent drought,
- ☆ High dependence on GOV resources





Pluralistic Extension System designed



- Pluralistic Extension System (PES) is an appropriate mix of public and non-public institutions to cater for extension services
- PES recognizes need to address agricultural challenges with different approaches – doesn't eliminate public extension,
- Minimize burden on public system and enhance effectiveness and efficiency

Why Pluralistic Extension System in Ethiopia?



The Process…





Meeeting

S



A Thinktank group deliveration n session



A national
Extension
Capacity
Building Task
force meeting



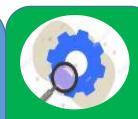
6th
Annual meeting conference of Ethiopian
Society of Rural Development & Agricultural Extension



Stakeholders'
Consultative
Meeting with
regions, HLI,
Coperatives
and private
sectors



National Stakeholders' Workshop



Technical Review and policy dialogue

Curren t Status

The Council of Ministers has approved the PES, and we are currently in discussions with the Parliamentary Agriculture Standing Committee

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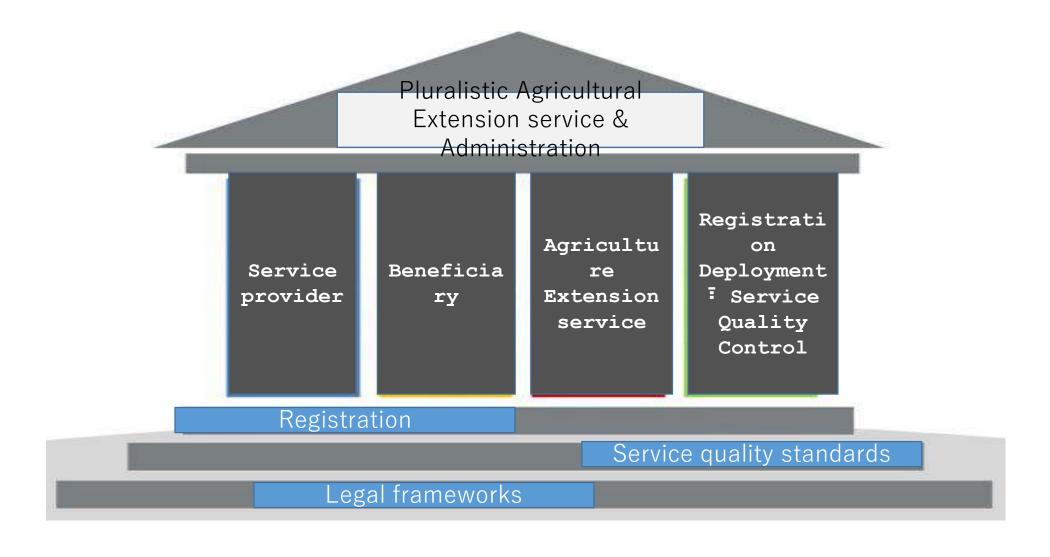
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Key features of the envisioned PES





Key features of the envisioned PES

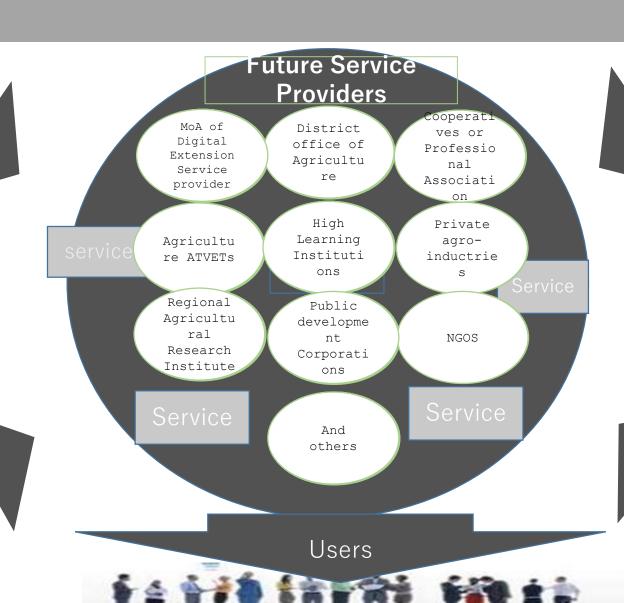


Ministry of Agricultur

- Policy & its tools
- Improve Capacity
- Deployment
- Provide service

Ethiopia Agricultura I Authority

- Registration
- COC
- Service Quality Control



Appropriat e Regional BOA

- Directives
- Capacity development
- Deployment
- Provide service

The **Appropriate** Regional Regulatory **Authority** Registration

- COC
- Service Quality Control

Types of Services in PES

Every service provider will be entitled to deliver the following extension services either independently or jointly.

- 1. Promote agricultural technology
- 2. Scaling up of agricultural technology
- 3. Agriculture business development service
- 4. Agricultural marketing extension and information service
- 5. Training service
- 6. Event organization
- 7. Partners and stakeholders' linkage and coordination
- 8. Facilitating agricultural input and output market linkage, and access to agricultural finance
- 9. Providing services that will change the lifestyle and mindset of rural residents



Major Roles of Extension Service Providers in PES



Public

- ☆ Coordinate/oversee extension service deliveries
- Guidelines and training modules preparation
- Provide support services (human resources, logistics, infrastructure and capacity development)
- Promoting and Scaling of Agricultural technologies and good practices
- Organize learning and experience sharing events
- Establish data/information management system.
- ☆ Provide digital extension service

Non-Public

- Carryout agricultural technologies popularization/promotion
- ✓ Provision of advisory and agricultural information services
- ✓ Trainings
- ✓ Event organizing
- ✓ Promote linkages and partnerships
- ✓ Facilitating/brokering agricultural inputs, market and financial services access to users

- Public extension services will continue to be provided for free for all users
- Mowever, fees/payment could be considered for special service deliveries
- Research organizations, HLIs (including private ones), NGOs, public enterprises, and cooperatives can provide extension services based on certification and regulation
- Registration, certification, and regulation of extension service provision
- Public extension services will be provided by Woreda Offices of Agriculture using FTCs/PTCs
- Federal (MoA) to Zonal Departments of Agriculture will have their own roles and responsibilities in building capacities of Woreda based Extension and FTCs/PTCs

- The Public Extension will be regulated to ensure quality, efficiency, and effectiveness of services
- Project based Extension Service Delivery is one of the peculiar part of the proclamation
- Extension fund secretariat will be established in MoA and Regional BoAs
- Incentives for service providers and users will be introduced
- Non-public extension service providers are entitled to provide services free of charge, fully paid, cost shared, or embedded

Payment Modality in PES



Non-Public Agricultural Extension Service Provider

Public Agricultural Extension Service Provider

1. Free Service Delivery

Public agricultural extension services provided by the Ministry and regional bureaus through woreda, kebele, or urban offices shall be delivered to all users at **no cost**.

2. High Investment Services

Services requiring significant investment in technology, knowledge, and skill transfer will be defined by regulations set by the Council of Ministers.

1. Non-Payment Services

Those who wish to provide agricultural extension services without payment shall not be prohibited.

2. Service Fee Modalities

- Non-public service providers may offer services under the following modalities:
 - a) With payment
 - b) Cost sharing
 - c) Payment embedded with agricultural technology or input

3. Government Intervention

The government may intervene to stabilize any payment escalation for services provided by non-public providers.

Registration, COC, and Service Quality Control in PES



Registration and Acquiring COC

1. Regional Service Providers

Any person serving as a provider in multiple regions must register and acquire a COC from the Authority.

2. Single Region Service Providers

Any person serving within one region must register and acquire a COC from the regional authority.

3. Public Service Provider Registration

- When a woreda, kebele, or urban office of agriculture is registered as a public provider, it must register its associated training centers or health posts.
- Any domestic, continental, or international institution wishing to provide agricultural extension services must be registered

4. Application Procedures for COC Issuance

Application Procedures for COC Issuance

To acquire a COC and serve as a provider, individuals must apply to the authority or regional authority using the designated application form and attach necessary documents.

Quality Control of Agricultural Extension Service

- Shall be conducted by the authority or a regional authority.
- The authority will assign inspectors for quality assurance.

The Council of Ministers 100% Voted to Forward the Draft Proclamation to the House of People's Representatives



The 45th Regular Session of the Council of Ministers

- The Council of minister deliberated on the Draft Proclamation for Multi-Stakeholder Agricultural Extension Service and Administration.
- Mistorically, agricultural extension services in Ethiopia have been provided dominantly by the government.
- There's a growing need to establish a system that allows for the participation of:
 - Non-governmental organizations (NGOs)
 - Private sector entities
 - Cooperative societies
 - Professional associations
- After thorough discussion, the Council of Ministers one hundred percent voted to forward the draft proclamation to the House of People's Representatives.





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