

Digital Innovations to Support Equitable, Sustainable, and Resilient Agri-Food Systems and Last Mile Delivery – a Snapshot of Ethiopia Proceedings of a workshop

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The [Sustainable Intensification of Mixed Farming Systems Initiative](#) aims to provide equitable, transformative pathways for improved livelihoods of actors in mixed farming systems through sustainable intensification within target agroecologies and socio-economic settings.

Through action research and development partnerships, the Initiative will improve smallholder farmers' resilience to weather-induced shocks, provide a more stable income and significant benefits in welfare, and enhance social justice and inclusion for 13 million people by 2030.

Activities will be implemented in six focus countries globally representing diverse mixed farming systems as follows: Ghana (cereal–root crop mixed), Ethiopia (highland mixed), Malawi: (maize mixed), Bangladesh (rice mixed), Nepal (highland mixed), and Lao People's Democratic Republic (upland intensive mixed/ highland extensive mixed).

The CGIAR [Digital Innovation Initiative](#) promotes digital tools for a more inclusive, sustainable food, land, and water future. This includes solutions for policymakers to bridge the digital gap, informing farmers about risks, and empowering communities with digital skills and resources. The Initiative works in Kenya, India, the Limpopo Basin in Southern Africa (including Botswana, South Africa, Mozambique and Zimbabwe) and Rwanda. and conducts additional research in Egypt, Bangladesh, and Indonesia.

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Abbreviations

ABC	Alliance Bioversity & CIAT
AICCRA	Accelerating Impacts of CGIAR Climate Research for Africa
ATI	Agricultural Transformation Agency
CIMMYT	International Maize and Wheat Improvement Center
CSA	Climate-Smart Agriculture
DII	Digital Innovation Initiative
ILRI	International Livestock Research Institute
MFS	Mixed Farming Systems Initiative
SLS	Sustainable Livestock Systems

Introduction

Digital technologies can potentially transform agri-food systems (AFS) in unprecedented ways. Unlike revolutions of the past which were mostly on-farm, digital technologies are spawning innovations on-farm as well at multiple points in the AFS value chain. The digitalization of value chains has the potential to not only deliver benefits like financial inclusion and better market access for smallholder farmers, but also improve their access to extension and information. The penetration of mobile phones as well as advances in mobile wireless technologies create unique opportunities to reach remote and underserved rural communities. Improving accessibility and timelines of dissemination of weather and market information can help farmers adapt their management to climate change impacts and build resilience. Receiving climate information, especially of impending weather events, can help farmers take pre-emptive actions and to minimize crop production losses from weather and climate induced events.

Across the CGIAR, several bilateral projects and One CGIAR initiatives are testing and implementing digital innovations across various thematic areas and geographies. The CGIAR Initiative on Digital Innovation (DII) is the CGIAR's flagship research program on digital innovation in food-land-water systems. The DII has several ongoing partnerships and activities across Asia and Africa ([Digital Innovation - CGIAR](#)). Linked to bilaterally funded programs, the CGIAR and its partners are also conceptualizing, testing and scaling digital innovations to address challenges faced by AFS. The AICCRA project for example, funded by the World Bank, features the development and deployment of digital platforms called AgDataHubs in its six country clusters (Kenya, Zambia, Ethiopia, Mali, Senegal & Ghana). Linked to digital infrastructure, are digital channels and partnerships with AgTechs for business model driven dissemination of weather based agro advisories to stakeholders.

The workshop held on May 14, at ILRI campus in Addis Ababa was aimed at introducing the Ethiopia country teams to AICCRA AgDataHubs and other digital innovation efforts in Kenya, Senegal, Zambia and Mali as well similar work being done with IMD in India under DII. Further, the workshop created an opportunity for the Ethiopia teams working on various digital agriculture projects to introduce the same to other teams. The session set aside significant time for an open discussion. The ultimate objective was to identify collaborative opportunities for the ILRI's DII team to support and make available some capabilities to assist the Ethiopia teams in using digital innovations for AFS transformation goals.

Speakers

- Anthony Whitbread, Program leader of Sustainable Livestock Systems, ILRI.
- Ram Kiran Dhulipala, Senior Scientist - Digital Agriculture and Innovation, ILRI.
- Wuletawu Abera, Senior Scientist, Alliance Bioversity & CIAT
- Hawinet Bekele: Head of Product Management, digital green
- Meron Sileshi, Communications and Business Development Lead, Lersha

Presentations

Digital innovations to support equitable, sustainable, resilient agri-food systems & last mile delivery: A snapshot of Ethiopia, by Anthony Whitbread, ILRI

The presentation discussed the use of digital innovations to support equitable, sustainable, and resilient agri-food systems and last mile delivery, with a focus on Ethiopia. It highlighted the global challenges of rapid population increases, demographic shifts, high income inequality, climate change, and degradation. The presentation also included a SWOT analysis of digital as an enabler for upscaling Climate-Smart Agriculture (CSA), identifying strengths (i.e. connectivity and strong IT capabilities), weaknesses (insufficient understanding of problems on the ground and fragmented solutions), opportunities (a digitally aware generation in farming and strong grassroots institutions) and threats (human and institutional capacities and financial challenges).

The speaker emphasized the need for digital innovations to address the challenges faced by the agri-food systems, particularly in Ethiopia. It highlighted the potential of connectivity, wireless technologies, and strong IT capabilities as strengths in enabling the adoption of digital solutions. However, it also acknowledges the weaknesses of the market, including subsidies distorting the market and insufficient understanding of on-ground problems. Overall, the presentation underscored the importance of leveraging digital innovations to create more equitable and sustainable agri-food systems.

ILRI's Digital Innovation Initiative (DII) portfolio & AICCRA's AgDataHubs, Ram Dhulipala, ILRI

ILRI's Digital Innovation Initiative (DII) portfolio and AICCRA's AgDataHubs are discussed in this presentation. It highlighted the common issues with existing weather based agro-advisory services or also known as AAS (Agromet-Advisory Services) and the need for digital platforms to integrate meteorology and agriculture extension. The AgDataHubs are national-scale platforms that integrate climate data with agriculture data to enhance AAS and their relevance to decision-making. The AgDataHubs are conceptualized and designed to be hosted and managed by national agencies in Kenya, Senegal, Zambia, and Mali. The AgDataHubs enable web-based access to localized global and local climate, weather, soils and agriculture datasets utilizing various data sources such as climate models, weather stations, satellite imagery, and third-party data. They have different layers for data processing, advisory, and dissemination, and aim to translate climate data into actionable advisory for the agricultural value chain. The AgDataHubs could also be extended to link with other digital innovations (Eg. iSAT) which translate the localized weather and climate data on AgDataHubs into context specific technology packages and management recommendations that minimize the climate risk for smallholder farmers. The speaker also referred to the opportunities of using Large Language Models (Eg. OpenAI and chatGPT) to also translate data on the

AgDataHub into simple advisories to support smallholder farmers and livestock keepers.

The presentation also referred to other ongoing projects with IMD (Indian Meteorological Department), including the enhancement of the Meghdoot mobile app and the testing of AI/ML and LLMs (Large Language Models) for automating agricultural and livestock advisories. The results from the pilot of using LLMs were promising, and IMD is interested in scaling up the project. ILRI is currently discussing the possibilities to co-develop AI/ML-based tools that could enhance the quality of livestock advisories on the Meghdoot app and collaborating with other organizations for South-South knowledge exchange.

Another key pillar of the DII activities are partnerships for impact which were highlighted, including the collaboration with The Agri-Collaboratory (TAC) and some strategic contributions emerging through this collaboration on Govt of India's AgriStack (DPI), creation of a new AgDX index to track the readiness of states to adopt the digitalization of agriculture and testing of innovative financing solutions for smallholder farmers based on non-traditional datasets. The AgDX has since also drawn in new partners like IFC (International Finance Corporation). The presentation also mentioned about ILRI's involvement in hosting the ICT4Ag 2024 conference at Nairobi. The presentation also touched upon ongoing co-development activities with Kaznet, AADGG, and OneHealth.

NextGen AgroadvisorySystem & National Ag Dathub, Wuletawu Abera, ABC-CIAT

The presentation discussed the NextGen Agro-advisory System and National Ag Datahub, which are aimed at providing agricultural advisory services and developing an integrated national agricultural data hub. The partnership, data processing, and data analytics are highlighted as key components of the system. The advisory generation is done through a web platform, and the dissemination of the advisory is carried out through various digital channels. The presentation also mentions the results and benefits of the solution, including the dissemination of the advisory to over 10,000 farmers and a grain wheat yield gain of up to 38% for those who applied the location-specific fertilizer advisory. The development of the integrated national agricultural data hub is outlined through several key steps, including mapping stakeholders, identifying and cataloguing agriculture-related data, and creating a technical team for data assessment and review. The speaker emphasized the federated approach to the data hub, with the main hub at the Ministry of Agriculture and a mini-research data hub at the Ethiopian Institute of Agricultural Research. The presentation concludes with links to websites for more information.

Digital Green Digital Initiatives, Hawinet Bekele, Digital Green

The presentation discusses the work of Digital Green focusing on smallholder farming communities across India, Ethiopia, Kenya, and other parts of South Asia and Sub-Saharan Africa. Their programs include video-based extension, farmer

profiles, data sharing through FarmStack, and scalable and Location-specific advisory through AgAdvisory Bot.

The video-based extension program involves farmer-to-farmer videos to enhance public extension. They work in 11,000 villages across different regions in Ethiopia and have seen over 40% of farmers adopting at least one new practice. The program also uses videos to train and orient development agents. They have 1,166 pico projectors and 48 video cameras for this program.

The Farmer Profiles program captures farmer information through a mobile app used by development agents. It includes profiles of farmers, their land holdings, and livestock ownership. They have supported the collection of over 1 million farmer profiles from various interventions within their work.

Data sharing is facilitated through FarmStack, an open-source protocol that enables the secure transfer and integration of data across the agricultural sector. It allows data sharing among agriculture service providers, and government organizations and farmers will as a result receive customized services and advisories. The Ministry of Agriculture (MoA) and Agricultural Transformation Agency (ATI) play a governance role in the ecosystem.

The AgAdvisory Bot is a channel that provides tailored advisory content integrated with development agent profile data. It allows for customized advisory delivered via development agents, who record reach and adoption data, as well as provide feedback on advisories. The bot has been used for site-specific fertilizer recommendations for wheat, resulting in 8-17% greater grain yield compared to generic recommendations.

The presentation also mentions AI-powered content retrieval and AI-powered extension as future developments (Farmer Chat). These initiatives aim to provide conversational assistance to development agents and improve farm demand, profile data, and localized advisory services. They have been tested in various geographies and are currently in the process of being implemented in Ethiopia as a way to make access to extension more dynamic and scalable.

Digital Green's initiatives focus on leveraging digital technologies to empower smallholder farmers and improve agricultural practices.

Digital Climate Advisory Services for to build Productivity and Resilience of SHF, Meron Sileshi, Lersha

Many smallholder farmers face a multitude of challenges, including limited access to essential resources like seeds and equipment, the constant threat of pests and diseases, the unpredictable nature of climate change, and difficulty in securing financing. This presentation dives into these struggles and introduces Lersha, a company taking a multi-pronged approach to address them.

Lersha utilizes a digital climate advisory service, providing farmers with personalized, location-specific guidance. They also connect farmers with crucial inputs and mechanization, facilitate access to financing, and establish market linkages for easier product selling. The presentation showcases Lersha's impressive growth in terms of workforce, geographical reach, and farmer engagement. It delves into their sustainability model, key milestones achieved, and projected future impact on smallholder farmer empowerment through digital extension services. Lersha's innovative bundling model integrates seamlessly with CIMMYT's technology, ensuring tailored support reaches even marginalized farmers. Ultimately, Lersha strives to achieve "Making agriculture easy for everyone" by harnessing digital solutions to boost farmer income, enhance food security, and build agricultural resilience.

Panel discussion:

Following the presentation speakers discussed the following questions.

- What are the challenges for greater uptake in digital agriculture?
- Priorities of the Ethiopian government in terms of digital agriculture policy direction
- The role of digital agriculture in the mixed farming systems innovations

The panel discussion addressed key challenges and opportunities in digital agriculture, specifically in Ethiopia. Here is a summary of the key points that emerged from the discussion:

Challenges for Digital Tool Uptake:

- Access to finance: Farmers need financial resources to adopt new technologies.
- Farmer willingness: Making technology portable and user-friendly is crucial for adoption.
- Outdated information: Providing timely and relevant information is essential.
- Integration challenges: Technologies should integrate with existing local solutions for easier access.

Challenges for the ATI 8028 Hotline Adoption:

- Literacy: Low literacy rates can hinder information access.
- Technology availability: Limited access to technology like phones can be a barrier.
- Accessibility: Reaching smallholder farmers in remote areas is challenging.

Building Trust in Digital Agriculture:

- Existing Systems: Leveraging existing extension systems can build trust between providers and farmers.
- Breaking Down Barriers: Efforts to make digital tools approachable are essential.

- Ecosystem Approach: A supportive digital agriculture ecosystem fosters trust.

Gaps in Research and Intervention Analysis:

- Business Model Research: More research is needed on sustainable business models for digital agriculture.
- Social Science Research: Ongoing social science research is crucial to understanding adoption patterns.
- Cost-Benefit Analysis: Cost-benefit analyses can help identify gaps and improve the digital agriculture roadmap.

Priorities for Advancing Digital Agriculture:

- Infrastructure: Building infrastructure to ensure farmers can access digital services.
- Data Analysis: Developing mechanisms to analyze and utilize agricultural data effectively.
- Policy and Governance: Creating an enabling policy and governance environment.
- Human Capital Development: Building capacity through training and education.
- Soft Skill Development: Equipping farmers with soft skills necessary for the digital age.
- Business Model Inclusion: Integrating innovative business models like TeleBirr for financial transactions.

Experience of other digital innovations shared by participants:

ICT for Animal Health in Southeast Asia (Hung Nguyen, Co-Leader, Animal and Human Health, ILRI):

- This project, developed in partnership with the Vietnamese government, provides farmers with an app to access animal health information and share photos of sick animals with experts for diagnosis.
- Challenges in Southeast Asia include:
 - Lack of incentive for farmers to report diseases promptly.
 - Difficulty integrating the app with existing local programs.
 - Data privacy and sharing policy considerations.

Radio and Mobile Technologies for Livestock Management in Ethiopia (Kindu Mekonen, Senior Scientist, SLS, ILRI):

- ILRI MFS in Ethiopia uses a radio program to promote livestock feed and forage innovations. This involved:
 - Assessing media consumption habits in Ethiopia.
 - Training journalists.
 - Creating content on feed and forage technologies broadcasted in three local languages.

- A challenge is accurately measuring the program's reach (how many farmers are listening). This year, baseline surveys were incorporated to address this.
- SLS also uses "mobile blasts" to send short, targeted audio messages to farmers in specific regions.

KAZNET: A Crowdsourcing App for Data Collection (Wako Gobu, Research Project Coordinator, SLS):

- This app leverages the growing smartphone ownership in remote areas for data collection in social and environmental research projects.
- Crowdsourcing offers an alternative to traditional methods (monitors or enumerators) that can be expensive in remote locations.
- KAZNET utilizes the Open Data Kit (ODK) for offline data collection and has a web interface for managing tasks.
- The app has been successfully used in East Africa since 2017 to collect high-frequency data from markets, households, and rangelands at a lower cost than traditional methods.

These experiences highlight the diverse applications of digital technologies in agriculture and the challenges specific to different regions.

Conclusion and recommendations

The speakers' presentation followed by participants' interventions stimulated interesting discussions. The discussions indicate the promise of digital innovations especially of generative AI and the excitement within governments, researchers and AgTechs on the potential of digital to solve intractable problems inherent to AgriFoodSystems (AFS). However, participants (especially from research community) indicated the need to generate more evidence especially on the impact created by past pilots. Another area of research is on business models that ensure that digital pilots become self-sustaining after grant money is exhausted. Also, there was some concern that if digital innovation is not done responsibly, it could exclude the small and marginalized farmers and further exacerbate the digital divide. The importance of capacity building at all levels as well as sensitization towards a responsible innovation paradigm was also briefly discussed. The discussion also took note of the immense locally led digital innovation efforts within Ethiopia but also stressed that linkages with what's happening globally could also prove beneficial for the local innovation ecosystem by facilitating access to more globally available innovation grants, capacity building opportunities as well as south-south linkages. The meeting ended with a call for action to link some of DII resources/initiatives with efforts ongoing in Ethiopia on digital agriculture.

Participants

27 participants from the CGIAR centres and local partners in Ethiopia attended the workshop.

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Annex 1 – Agenda

March 28 th 10.00-12.00			
	Topic	Presenter	Time
	Setting the context of digital agriculture in development	Anthony Whitbread	5 min
1	Introduction to the AICCRA AgDataHubs in Kenya, Mali, Zambia and Senegal & the portfolio of DII projects.	Ram Kiran Dhulipala	12 mins
2	Ethiopia AgDataHub	CIAT	10 mins
3	Digital Climate Advisory Services	CIMMYT/Lersha	10 mins
4	NextGen site specific agro-advisory	Digital Green	10 mins
5	Open Discussion - Opportunities for collaboration and support with DII & MP	Anthony/Ram	45 mins
6	Vote of thanks	Million	8 mins

Webinar announcement

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Title: Digital Innovations to support equitable, sustainable & resilient agri-food systems & last mile delivery – a snapshot of Ethiopia

Date & time: Tuesday, 14 May 2024, 10:00–12:00 hrs.

Venue: Azage Auditorium, ILRI Addis campus

Organizers:



Ram Dhulipala, Senior Scientist,
Digital Agriculture and Innovation,
SLS, ILRI



Wuletawu Abera, Senior Scientist,
Alliance Bioversity & CIAT



Anthony Whitbread, Program Leader,
SLS, ILRI



Hawinet Bekele, Head of Product
Management, Digital Green



Meron Sileshi, Business Development
and Communications Lead, Lersha





<https://www.cgiar.org/initiative/19-sustainable-intensification-of-mixed-farming-systems/>

