



Digital  
Agri Hub

# Enhancing Digitalisation for Agriculture with AI: Winners and Losers?

Summary of the 3<sup>rd</sup> e-conversation, 2<sup>nd</sup> series

## Collaborating organisations

This e-conversation has been hosted by the **Digital Agri Hub** and run in partnership with **Genesis Analytics**, **GIZ (FAIR Forward – Artificial Intelligence for All programme)**, and benefited from the technical cooperation of **USAID** and the **Food and Agriculture Organization of the United Nations**.

Starting date	Closing date	No. of posts	New members
30 Oct. 2023	26 Nov. 2023	60	380

Some stats

## E-conversation framework:

The relationship between #AI and digitalization for agriculture (#D4Ag) appears to be a significant and promising one, as AI technologies have the potential to revolutionize and enhance various aspects of agriculture through digitalization. Digitalization refers to the process of using digital technologies to transform and streamline various processes, while AI involves the creation of systems that can perform tasks that typically require human intelligence.

The relationship between AI and #D4Ag is supposed to be one of mutual benefit. Digitalization provides the data and infrastructure necessary for AI to function effectively, while AI enhances the value of digitalization by deriving meaningful insights and automating processes that would improve agricultural productivity, profitability, and sustainability also in low- and middle-income countries (LMICs) and within small-scale producers.

A recent study conducted by Genesis Analytics, which was funded by the Bill & Melinda Gates Foundation and USAID, identified a broad range of use cases where AI and digitized automation solutions are being deployed across agri-food value chains in LMICs. While this adoption is

skewed towards large and more commercially oriented producers, there are many solutions where frontier technologies are applied on the back end and delivered to small-scale producers (SSPs) using a combination of low-tech delivery channels, in-person intermediary networks and partnerships with value chain stakeholders willing to subsidize the cost of the solution.

In the medium term, complementing digital solutions for agriculture with AI is likely to modify the locus of decision making along agricultural value chains. Would this empower or disempower the users of such solutions? Are some experts and public opinion putting too many expectations on the supposed benefits of AI for agriculture?

Q1

As AI adoption gathers pace in agriculture, also in low- and middle-income countries, what ethical considerations arise concerning data sovereignty and how can these be effectively addressed?

Q2

In the medium term, how will the mainstreaming of digital and AI driven information services impact agricultural employment in low- and middle-income countries? Which areas of agricultural value chain are going to be affected the most and how?

Q3

The rapid advance of large language models (which are a type of AI that can exploit huge quantity of data to generate meaning and conversations) promises much for supporting SSPs, particularly through intelligent extension advisory bots. How can these LLMs/chatbots help organizations providing technical information assist farmers and other agriculture beneficiaries more effectively? How could these models best incorporate low resource languages for inclusivity and impact? What are the considerations for establishing /rolling out these chatbots in an inclusive, accurate, impactful, and ethical manner?

Q4

## Summary of the e-conversation (ChatGPT assisted)

The integration of artificial intelligence (AI) into agriculture has emerged as a catalyst for potential empowerment and transformation, particularly for small-scale producers in low- and middle-income countries (LMICs).

**1<sup>st</sup> question:** In the medium term, complementing digital solutions for agriculture with AI is likely to modify the locus of decision making along agricultural value chains. Would this empower or disempower the users of such solutions? Are some experts and public opinion putting too many expectations on the supposed benefits of AI for agriculture?

The initial question posed was centred on the probable modifications in decision-making within agricultural value chains due to AI. This question accounted for 40% of the total contributions to the e-conversation. Responses reflected a mixture of optimism and caution. AI-driven real-time decision support tools were considered by some as game-changers, offering personalized assistance in critical agricultural decisions like planting, harvesting, and pest management. The promise of boosting productivity and profitability excited many, yet some participants expressed some areas of concern. **Aneesh Chauhan** stated that *"AI will (is already having) have a significant impact especially in the digital spaces cross-domains, and agriculture will not be an exception"* with the caveat that *"the empowerment resulting from AI systems is precarious because of the reliance on representative data, is very hard to get in many parts of the world due to limited capacity or infrastructure to capture the diversity of data needed. Biases in data will lead to faulty advice"*.

There was a recognized risk that if these AI solutions were primarily accessible to larger commercial farms, existing inequalities could worsen. This underscored the need for inclusive design principles to ensure accessibility and relevance for small-scale agricultural producers. **Philémon Ayihonsou** stressed that *"the integration of AI into digital solutions for agriculture can be beneficial if implemented responsibly and inclusively, with adequate training for users."* **Erika Quendler** added that *"enhancing the skills and capabilities of farmers in the context of AI integration is vital for ensuring that they can effectively utilize these technologies to their advantage while retaining their resilience and autonomy within the agricultural value chain at all levels."*

Ethical considerations assumed a central role throughout these conversations, particularly regarding data ownership, validity, and governance. Participants stressed the necessity for high-quality, current data that accurately represents the dynamic agricultural landscape, especially in the face of climate change. The consensus was in favour of interoperable data systems that seamlessly merge real-time information sourced from diverse public, private, and civil agricultural programs. Such integrated systems were deemed pivotal not only for providing policymakers with a comprehensive, current overview but also for streamlining access to information by farmers.

**Jona Repishti**, head of Global Gender Programs at DigitalGreen reported that they *"are carefully building the content corpus [of the [Kenya Chat Bot](#)] with vetted advisory content (e.g. using advisory videos, farmer call center logs, and factsheets) as the core dataset for training [their] AI-enabled digital assistant"* and that this process is complemented by a *"continuous feedback loop"* with users.

**Modibo G Coulibaly** called the attention that in the midst of a flurry of considerations about the deployment of AI in agriculture in LMICs one key input has to be considered: funding.

**2<sup>nd</sup> question:** As AI adoption gathers pace in agriculture, also in low- and middle-income countries, what ethical considerations arise concerning data sovereignty and how can these be effectively addressed?

The concept of data sovereignty became central part of the ethical conversation, although few contributions were recorded (10% of the total contributions), probably because of a sweeping and comprehensive response posted immediately after the question was posed. In any case, the debate around the concept of data sovereignty underscored the significance of countries or regions having authoritative control over data generated within their respective borders. Some participants shared examples of how different countries were designing their data policy and highlighted a very critical question of whether the AI in agriculture was reducing farmers and their farms to a data commodity instead of helping them with the real challenges of production and farm ownership. In this respect **Ashish Gupta-jee** wrote that *"the speed at which Agritech is 'gaining'/'purchasing' farmers into their data systems, by converting the living producer and their thriving 'farm' into a 'data' commodity, is a question on ethics and sovereignty, perhaps for anthropological researchers to ponder upon."*

Ultimately, the discourse expanded to encompass issues of data privacy, security, transparency, and the equitable distribution of benefits arising from AI utilization in agriculture. Participants in the e-conversation unanimously stressed the pressing need for robust national regulatory frameworks and a well-established data-sharing infrastructure to empower countries and farmers to effectively manage and govern their data resources. **Ben Addom** concluded that *“development partners, donors, international financial institutions, etc. who want to help low- and middle-income countries boost investment into their agricultural sector and transform the food system through AI should first go back to the data sovereignty issue.”*

**3<sup>rd</sup> question:** In the medium term, how will the mainstreaming of digital and AI-driven information services impact agricultural employment in low- and middle-income countries? Which areas in an agricultural value chain are going to be affected the most and how?

Once the 3<sup>rd</sup> question was launched, exchanges focused to the potential impact of AI adoption on agricultural employment in LMICs. This question registered 17% of the total contributions. Diverse perspectives emerged, some foreseeing AI as a catalyst for creating valued jobs, increasing efficiency, and stimulating economic growth. Yet, others remained cautious, expressing concerns about potential job displacement. **Ken Lohento** reported that *“Generally, it is believed that jobs which will be replaced by AI, are routine and repetitive jobs that do not require significant sociability, creativity, dexterity, and those based on the analysis of large existing databases (AI tools are very powerful as we know to work on data analysis). Therefore, for now, job losses may, in the short to medium term, occur more specifically in repetitive and routine positions; so, more at the lower end of the employment ladder in the agriculture value chain in Africa”,* and **Giacomo Rambaldi** pinpointed that grading, sorting, and packaging of fruits, nuts and vegetables destined for export are domains where AI may impact employment in the short term. **Anish Gupta-jee** shared his opinion that *“there appears to be no vision/ horizon where the probabilistic output of AI driven information service, shall provide any information of value which shall be better than what Farmer-Farmer exchanges take place ...”* and about the grading of fruits and vegetables he uttered his belief that from an agro-ecology perspective *“there is no harm in having a crooked carrot, [as] it is still a carrot.”*

Various contributions to the e-conversation underscored the importance of AI complementing rather than replacing human efforts. Retaining and integrating traditional knowledge systems alongside technological advancements emerged as an essential strategy for sustaining agricultural practices in these regions.

**4<sup>th</sup> question:** The rapid advance of large language models (types of AI that can exploit huge quantity of data to generate texts, audio-visual productions and conversations) seems to promise much for supporting small-scale producers, particularly through chatbots.

- How can these LLMs/chatbots help organizations providing technical information assist farmers and other agriculture beneficiaries more effectively?
- How could these models best incorporate low resource languages for inclusivity and impact?
- What are the considerations for establishing /rolling out these chatbots in an inclusive, accurate, impactful, and ethical manner?

The promise of large language models (LLMs) and chatbots in supporting small-scale producers sparked interest with a total of 22 contributions representing 33% of the total number.

Conversations revolved around the collaborative synergy between humans and AI (**Ben Addom** insisted on the need to put human first in the Human – AI collaboration), emphasizing the crucial role of these tools in integrating local languages and cultural nuances to ensure maximum accessibility and effectiveness. Challenges such as the scarcity of extension workers (cited by **Andrianjafy Rasoanindrainy** and others) and the necessity for generative AI tools rooted in local knowledge and practices emerged as pivotal considerations for an inclusive and impactful rollout.

In summary, the e-conversation on AI's contribution to D4Ag in agriculture in LMICs captured a nuanced understanding of the varied aspects associated with its integration. The overarching themes raised by the four questions posed, emphasized intentional and inclusive design, ethical considerations, the importance of national regulatory frameworks, and the imperative balance between technological innovation and human-centric approaches for sustainable and equitable agricultural development.

## Shared Resources

### Cited literature:

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Elbehri, A. and Chestnov, R. (eds). 2021. [Digital agriculture in action – Artificial Intelligence for agriculture](#). Bangkok, FAO and ITU.

Genesis Analytics. 2023. Inclusively Advancing Agri-Food Systems through AI and Automation. 97 pages. <https://tinyurl.com/2bqtwlvk>

Gmyrek P., Berg J. and Bescond D. 2023. [Generative AI and jobs: A global analysis of potential effects on job quantity and quality](#). ILO. August 2023

HM Treasury. 2018. [The economic value of data: discussion paper](#). August 2018

PwC. 2020. [Sizing the prize. What's the real value of AI for your business and how can you capitalise?](#) 32 pgs.

Tzachor, A., Devare, M., Richards, C. et al. [Large language models and agricultural extension services](#). Nat Food 4, 941–948 (2023).

### Cited IA-powered agents

- <https://viamo.io/ask-viamo-anything-ai>
- [https://t.me/farmer\\_chat\\_kenya\\_bot](https://t.me/farmer_chat_kenya_bot) (to use it you will need telegram access; this bot is currently trained on dairy, potato and coffee value chains).
- <https://farmer.chat/>

### Cited multimedia:

Can AI inclusively advance agri food systems <https://www.youtube.com/watch?v=zGR8Yq2o8W0>

### Cited websites / webpages:

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- Addom B. 2023. Commonwealth Secretariat launches initiative to support member countries to better manage agricultural data through DPI. The Commonwealth, 15 Sep. 2023. <https://tinyurl.com/yt4y56aa>
- [AI Safety Summit, hosted by the UK, 1st and 2nd November 2023 at Bletchley Park](#)
- Bloomberg News. 2023. [AI could replace 4 million jobs in South Korea](#) Bangkok Post PCL. 16 Nov 2023
- Call for blogposts on AI and agriculture for the platform AgriLinks: <https://www.linkedin.com/company/agrilinksorg>
- European Commission. 2017. Antitrust: [Commission fines Google €2.42 billion for abusing dominance as search engine by giving illegal advantage to own comparison shopping service](#) – Factsheet
- Farmer-Centric Data Governance: Towards A New Paradigm. Development Gateway. <https://tinyurl.com/2oy8gbpl>
- Kenya Agricultural Data Sharing Platform (KADP) <https://tinyurl.com/yobvzas7>
- Peters J. and Davis W. 2023. [The New York Times blocks OpenAI's web crawler](#). The Verge. Aug 22, 2023.
- ['Use of artificial intelligence for creating 'deepfake' problematic', says PM Modi urging media to educate people](#). Times of India. Nov 17, 2023