Digital Extension for Inclusive Agrifood Systems Transformation

Issue Brief| February, 24, 2026

Prepared by: Dr. Suresh Babu, Emeritus Fellow, International Food Policy Research Institute (IFPRI) and Mehnaz Wani, Sr Manager, Policy Research and Knowledge Management, World Agriculture Forum.

WWW.WORLDAGRICULTUREFORUM.ORG

Agrifood systems are poised for a rapid transformation with the advent of the AI revolution that is shaping all segments of the society. The last two decades witnessed digital experimentation that led farmers in Africa, Asia, and Latin America that effectively engage in the digital transformation and receive mobile agronomy tips, hotline support, app-based recommendations, and SMS weather alerts. Yet a majority of the smallholder farmers are yet to receive such help for their locality specific and context specific challenges they continue face in their local agrifood systems. Now, the agrifood systems face a unique challenge: How to ride on the AI revolution wave and make sure that no farmer is left behind. Inclusive technological progress requires strategic approaches at the policy, institutional, technological innovation, local governance, and skill development for the farmers.

Possibilities of AI-driven transformation of precision soil diagnostics, satellite-enabled monitoring, predictive crop modelling, and real-time climate intelligence are all changing the definition of "extension." Agricultural and rural advisory systems are no longer mere informational channels. They are evolving into decision engines that process massive data streams to produce real-time recommendations at the farm level. AI-enabled tools can improve climate adaptation, maximize input utilization, reduce environmental damage, and facilitate farmers' access to markets more effectively. For smallholder farmers dealing with climate uncertainty, AI-enabled climate-smart agriculture improves predictive analytics and localized modelling. This shift, indeed, has a lot of potential and at the same time brings uncertainty for the agrifood systems.

Who benefits from this shift and who might be left behind? The lessons from the first wave of digital transformation have both encouragement and caution for us. Digital advice does increase knowledge and sometimes productivity, but higher yields do not necessarily equate to higher incomes. Information is not enough when farmers do not have access to markets, price stability, or even bargaining power. In other words, digital extension did make it easier to get advice, but it did not always make opportunities more accessible to all class of farmers. If the AI era concentrates solely on improving production through more accurate fertilizer application, better pest prediction, and smarter irrigation without incorporating market intelligence, quality standards, and value-chain coordination, we run once again the risk of repeating the same limitations at a more complex scale. Therefore, the future of digital extension needs to shift from advice to decision support that is aware of the market, price signals, logistics limitations, sustainability metrics, and climate forecasts, all integrated by AI. However, that integration will not occur automatically. It needs to be carefully strategized, planned, and executed.

Technology often arrives with the promise of democratization. But inclusion does not happen on its own. Women farmers frequently have lower access to smartphones, lower digital literacy, weaker to no land ownership rights, and lack formal financial services. Digitally marginalized communities for

example pastoralists, small island farmers often function outside formal data systems. If AI models are trained on biased or incomplete datasets, they may systematically favour better-connected or better-resourced farmers. So, to prevent structural inequalities, AI-driven agricultural systems need to pay close attention to data rights, representation, and accountability. Inclusion is not a by-product of innovation. It is a design choice.

The technologies are advancing rapidly but the institutions guiding them are evolving slowly, this imbalance was also highlighted and reflected upon in one of the recent policy dialogues by World Agriculture Forum on “Advancing Sustainable Agriculture: From Policy to Practice”. Many nations have fragmented digital extension ecosystems due to overlapping platforms, unclear standards, week oversight, and limited interoperability. As advisory systems develop into automated and predictive decision-making tools, the stakes become significantly higher. Therefore, few critical questions arise: Who would be accountable if an algorithm’s recommendation results in crop or financial loss? Who owns the data produced on farms? How do private digital platforms incorporate national food security and climate goals? How are smallholders included meaningfully into the system design?

AI models such as Falcon AI which was highlighted in the dialogue demonstrate significant technical promise, but technological capability alone is insufficient. Models must be adapted to local agronomic conditions, farmer realities, and sector-specific needs to maximize impact. Most importantly, AI should These concerns were also discussed in the World Agriculture Forum’s earlier dialogue on “Digitalization and AI Applications in Agriculture.” That dialogue emphasized: first the need for legal and regulatory structures to evolve alongside AI adoption. Without robust policies governing data rights, accountability, and oversight, AI risks deepening structural inequalities rather than bridging them. Second, digital literacy is foundational and must expand not only among farmers and extension agents but also within institutions and policymaking bodies. For fair participation in AI-driven systems, empowerment is crucial and Governance structure cannot function if users lack the capacity to question, interpret, or influence digital tools. Third, data quality and validation are non-negotiable. AI systems are only as reliable as the data behind them. Publicly validated and standardized datasets were highlighted as critical for building trust, ensuring transparency, and enabling scalable impact. Fourth, interoperability and digital public infrastructure are central to inclusion. Fragmented platforms limit effectiveness and increase costs. Open standards and interoperable systems can reduce duplication, promote competition, and prevent farmers from being locked into isolated ecosystems. Also, as systems transition from advisory support to automated decision-making, clear policies on data governance, cybersecurity, transparency, and liability are crucial.

The importance of collaboration between technology developers and the agricultural sector cannot be enhance farmers’ knowledge and not replace it. Human-centred design should remain at the core of digital innovation. Farmers are not passive recipients of algorithmic advice; they are the decision-makers and their experience, knowledge and contextual understanding are irreplaceable.

Technology will keep advancing. The real test would be whether governance advances with it and if at all inclusion remains the guiding principle rather than an afterthought. What is at stake is far larger than extension reform. AI-enabled advisory systems are beginning to shape cropping choices, resource allocation, water use, emissions pathways, market participation, and access to finance. They have an impact on how employment trends change in rural areas, who joins higher-value supply chains, and how climate pledges are reflected in farm-level decisions. Digital extension can increase gender-equitable access to services, boost market-responsive value chains, speed up climate-

resilient production, and promote integrated food system transformation if it is managed properly. Inadequate governance runs the risk of maximizing efficiency without guaranteeing equity and consolidating power among a few platform providers.

As we approach the Policy Dialogue on Digital Extension for Inclusive Agrifood Systems Transformation on 26 February 2026, the central question to ponder upon would be if we can intentionally shape the AI- driven digital transformation ensuring that women farmers, smallholders, and digitally marginalized communities are not merely users of digital systems but are key players in their design and governance.

The policy dialogue will address the following key issues and challenges:

1. What types of policies and strategies should be in place for smallholder sector to take full advantage of the AI-led digital transformation?
2. What institutional and regulatory mechanisms are needed to ensure the safe use of digital technologies by the smallholder farmers, women and youth in agriculture?
3. What are the local investment and governance structures needed for the effective deployment of the AI- driven digital transformation?
4. What role can early-stage start-ups and the private sector play in ensuring inclusive digital extension systems that benefit all farmers?
5. How can existing systems of extension and advisory services be reshaped to help the translation of knowledge into benefits for all actors in the agrifood systems in low- and middle-income economies?

These questions will guide the Policy Dialogue and create a space to reflect on what is working, what is not, and what needs to change in order to make digital extension truly inclusive for agrifood systems transformation.