

Participatory recommendations on the inclusive digitalization of agriculture that contribute to the on-farm experimentation value proposition

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Abstract

Eight partners in the Global Forum on Agricultural Research and Innovation (GFAR) worked for over two years in a collective action to understand and address inclusion challenges in the digitalization of agriculture. By following a farmer-driven participatory and consultative approach in Latin America and Asia, partners managed to elicit and consolidate a set of good practices and a call for action to make digital solutions more inclusive and adoptable. In this paper, we illustrate the process followed and the resulting recommendations, which cover both the specific features that inclusive digital solutions should have and the design and governance actors/approaches. We also elaborate on how on-farm experimentation can play an important role in integrating some of these recommendations for an inclusive approach.

Introduction

The Global Forum on Agricultural Research and Innovation (GFAR) is a neutral platform with a diverse membership that fosters innovative multistakeholder partnerships, with a special emphasis on empowering small-scale farmers. A typical incarnation of these innovative partnerships is GFAR collective actions (CAs). One such CA is the inclusive digital transformation of agriculture. Eight core partners and 28 indirectly involved national organizations worked in different phases over two years in this CA to address the issue of the inclusivity of digital agriculture (DA) solutions. In each phase, the partners chose how to work and what to produce with a common objective: understand the attitudes of small-scale farmers toward digitalization and elicit ideas and recommendations from them following a participatory farmer-driven approach.

The final objective was not to consolidate the findings of the different phases into a homogeneous general set of recommendations: the objective was to make the various actors who participated—but primarily the farmers' organizations (FOs)—aware of their needs and demands, let them decide on which type of product they wanted from the action, and empower them to proactively create this product, and then take ownership of it and use it for advocacy and negotiations. The result was that in one region, they decided to have a multistakeholder approach and produce a set of good practices, and in another region, the FOs worked mostly among themselves and decided to produce a call for action.

However, even without the intention of achieving a general set of recommendations, highlighting the main conclusions and recommendations from each phase makes it evident that, even if with slightly different objectives, the consultations have brought to analogous results and give each other reciprocal confirmation. This is why in this paper

we present the three different sets of recommendations, largely converging but each with its nuances, with no pretense of completeness or systematization, suggesting that On-Farm Experimentation (OFE) can make use of some of these recommendations, either as part of the OFE value proposition or as evidence that there is a strong need for the participatory farmer-centric approach followed by OFE.

We will focus only on the recommendations resulting from two regional phases (briefly describing the participatory process) and one global e-discussion, not on the results of the preliminary surveys on needs and attitudes, which, for this paper, are part of the input to the final recommendations.

Findings from collective action on inclusive digital agriculture

Good practices from farmers' surveys, interviews, and a multistakeholder consultation

The first phase of the CA took place in Latin America and the Caribbeans, led by the Forum of the Americas for Agricultural Research and Technology Development (FORAGRO) in partnership with the Confederation of Family Producers Organizations of the Expanded Mercosur (COPROFAM) and their network of national associations, the Global Open Data for Agriculture and Nutrition initiative, and the AgGateway consortium of DA solution providers. The partners in this region decided that their objective would be to identify a set of good practices to help digital technology providers develop more inclusive solutions.

Based on desk research that clarified the regional context and identified a first set of issues, the partners developed a questionnaire for a survey of small-scale farmers, with questions recommended by the farmers' federation. The questions were quantitative and mostly categorical, capturing information on both the type of farm and farming and, primarily, on respondents' attitudes toward digital solutions. The prospective respondents were small-scale farmers in the partners' networks. The online survey was distributed in October 2021 for three weeks through email, social platforms, and chat tools. Although this medium had the limitation of requiring connectivity, the invitation went through COPROFAM's channels to ensure that family farmers were reached. The survey collected 365 responses from 16 countries.

A third phase consisted of identifying potential success stories, based both on recommendations from the partners' networks and on survey responses, and conducting interviews with a selected few. 25 success stories from 14 countries were identified between March and May 2022, and five were selected for interviews. These success stories were used to try to extract the key elements that made them successful in integrating the findings from the survey. Finally, all input and evidence were used to draft a set of recommendations, and a multistakeholder consultation was conducted to validate them. The virtual consultation took place on October 14, 2022, with 20 participants from FORAGRO's multistakeholder network (FOs, higher education and research, governmental, and intergovernmental).

The identified good practices, published in 2022 [FORAGRO 2022], are grouped into five main categories: these categories almost amount to principles, while individual practices are here briefly exemplified in parentheses:

- Communication solutions based on technological tools accessible to family farmers, e.g., functionalities without connectivity or communication via instant messaging (main evidence: survey questions on connectivity and success stories).
- Inclusive development and technological co-design with the significant involvement of family farmers; this involves participatory design and developing

- technology based on documented family farming needs as well as conducting pilots and support programs (main evidence: success stories).
- Collaboration and associative processes are the basis for inclusive DA (such as collective commercialization among family farmers, multistakeholder partnerships, and strengthening FOs). Main evidence: success stories and interviews. In Uruguay, two farmers praised their cooperative for enabling remote communication and facilitating inter-organization sales, online banking, and accessing government procurement all "from their home," which made them "overcome their fears" of digital technologies.
 - Solutions transforming technical assistance with the intensive use of data and digital tools (such as the use of applications and remote support for technical assistance, as well as appropriate languages, formats, and resources). Main evidence: success stories and survey results show that at least half of the respondents, although not using any digital technology in the field, use digital extension services. One family farmer in Brazil built his network of remote technical assistance on YouTube: "I like to receive feedback from people who watch me, to hear about their experiences on their various farms, that way we create an information network that strengthens all of us.")
 - Empowering family farmers and their organizations with a focus on appropriate technology and technological sovereignty, including capacity development and democratization of access: free open-source tools and data, or associations'/cooperatives' proprietary solutions (main evidence: success stories and interviews).

Call for action from small-scale farmers in Asia

The second regional phase of the CA was conducted in Asia, led by the Asia-Pacific Association of Agricultural Research Institutions in partnership with the Asian Farmers' Association for Sustainable Rural Development (AFA), and with the collaboration of six National Agricultural Research Systems and 13 FOs. The objective of the AFA's work, in particular, was to engage small-scale FOs in writing a call for action and providing their recommendations on DA.

AFA first conducted a survey among FOs in nine countries regarding their concerns, expectations, and demands for digitalization in agriculture. Prospective respondents were family farmers reached by FOs in the AFA network. The survey collected 372 responses from 12 FOs in nine countries. It used the same questions as the survey in Latin America, with slight changes and additions to tailor it to their needs. Associations in a few countries went beyond the survey and either conducted a focus group (Cambodia) or contributed an "experience" to highlight what works and what does not (India and Laos).

Finally, the AFA convened a farmers' organization consultation on October 18, 2022, hybrid, with 40 participants from member FOs in 12 countries, to discuss survey results, experiences presented by selected countries, and the call for action. Exchanges on the revisions of the call went on after the consultation. The call for action was published in 2023 [AFA, 2023] and signed by 13 FOs.

In this call for action, while stating that they recognize the potential of DA, Asian farmers highlighted some challenges and concerns: 1) internet availability being limited, and farmers facing challenges related to internet stability, speed, and high fees; 2) women farmers in some countries facing barriers to ownership and access; 3) many existing high-tech digital tools for agriculture being designed for large monoculture farms and being unaffordable for small-scale farmers (also due to inappropriate pricing models not taking into account the realities of small farmers), thus exacerbating existing disparities, and farmers having limited knowledge and skills in accessing and using basic digital tools.

The document calls for concrete actions from the government, development agencies, and the private sector to support the access of small-scale farmers to appropriate DA innovation:

- Evaluate the advantages and disadvantages of digital transformation in agriculture and integrate the results into existing policies and programs, developing policies tailored to small-scale farming. (Farmers highlighted how "most innovations have been designed for the more economically advanced countries and large commercial and mono-crop farming systems.")
- Ensure the active involvement of small-scale farmers in the development of digital technologies to ensure their appropriateness and responsiveness to farmers' needs; co-design digital technologies with farmers and enable their participation in decision-making processes. Regarding appropriateness, one farmer highlighted how even a small difference, like the height of a crop in a region, can make a digital solution useless in that context.
- Tackle accessibility, affordability, and connectivity challenges by ensuring internet connectivity in rural areas and providing support for digital devices and technologies.
- Devise solutions for safeguarding small-scale farmers' data and their rights and control over their data and knowledge.
- Promote partnerships between FOs, cooperatives, governments, research agencies, development institutions, and private entities.
- Promote inclusive platforms and opportunities that enable FOs and cooperatives to participate in implementing DA programs and projects.

E-conversation on digitalization and agroecology

Beyond the regional participatory actions, we want to mention here another consultative activity conducted in the same CA because it brought up several inclusivity issues and produced some recommendations. It was an e-conversation hosted by the Digital Agri Hub (DAH) in partnership with GFAR, the University of British Columbia, and the Agroecology Coalition. It took place from July 17–August 2, 2023, and it involved 32 active contributors from a total audience of more than 1,800 members of the DAH community, which is mainly composed of DA and extension specialists. A summary is available online [Digital Agri Hub, 2023].

This exploration brought up inclusivity issues because they are inherent in the "transformational" subset of the HLPE "13 principles of agroecology," leading to "a new global food system based on participation, localness, fairness, and justice" [HLPE 2019].

While opinions in the discussion varied depending on the specific area of application, precision farming emerged as the most divisive topic. Some contributors argued that there is an inherent incompatibility between precision farming and agroecology. They expressed concerns about the elimination of human labor, devaluation of farmers' knowledge and deskilling of farmers, the risk of monopoly, and external control and dependence.

However, most of the participants emphasized that there are pathways to digitization for agroecology. They highlighted how compatibility is affected by the values and models behind the technologies rather than the technologies per se.

The following is a list of such values and models taken from the e-conversation summary and includes examples relevant for inclusion in brackets, which can easily be translated into recommendations for inclusive digital solutions:

- The values behind technologies (e.g., diversity as a challenge vs. diversity as a value)

- Business models (corporate profit model, lock-in, and data concentration vs. cooperative- or farmer-led models and data sovereignty; low/high operational cost)
- Design/delivery approaches (e.g., top-down and prescriptive vs. peer-to-peer and codesign)
- Design choices (e.g., opaque vs. transparent algorithms, mainstream/standardized vs. context-specific)
- Ultimately, the kind of power dynamics that are triggered and favored.

Inclusive DA approaches and the OFE value proposition

The three sets of recommendations described above highlight some common challenges and recommended paths: the importance of inclusive and participatory design and governance in the development of digital technologies for agriculture, the need for context-specific solutions, the need to always consider low-tech and affordable solutions, the importance of technology and data sovereignty, and the crucial role of associations, cooperatives, and community networks.

All of these aspects are highly relevant to OFE. OFE embodies the principles of participatory design, co-learning, and scalability, fostering a sustainable and inclusive approach to agriculture.

The recommendations for inclusive DA presented above can be (and implicitly already appear to be) part of the OFE value proposition, especially under the following key OFE principles:

- Farmer-centric: The involvement of farmers, not only in the testing but also in the design and governance of digital solutions, is a natural requirement for OFE. To make the value proposition more inclusive, co-research can extend to governance, with small-scale farmers having a voice in decision-making processes related to the digital solutions developed and used in OFE. Governance also includes considerations of technology and data sovereignty, in particular, clear negotiation of data ownership, privacy, and security terms.
- Co-learning: Co-learning is an essential dimension of OFE. OFE is also expected to bridge the gap between traditional farming practices and modern agricultural innovations, aligning with the recommendations in the previous chapters that digital tools should complement, rather than replace, traditional knowledge.
- "Real systems" and "scalable": As seen in the call for action above, small-scale farmers ask that research be based on their day-to-day realities.

They can also be used as evidence that there is a strong need for a participatory farmer-centric approach followed by OFE.

Conclusion

Integrating digital inclusion recommendations—like the ones emerging from the consultative processes in the GFAR CA—into the OFE framework is something that seems only natural, considering how well aligned (and even implicitly embedded) these recommendations are with the OFE principles. When small-scale farmers are actively involved in the design, governance, and benefits of digital solutions, the outcomes of experimentation become more relevant and impactful.

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