SUMMARY

Virtual Consultation: Digital Agriculture and Inclusion – Priorities for the agricultural research, development and innovation agenda in Latin America and the Caribbean

Content

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Introduction

The application of digital technologies in agriculture with the aim of improving efficiency, productivity and resilience to climate change, is growing exponentially in the world and in our region. But these technological developments are not among the usual issues addressed by the actors of agricultural innovation systems. For this reason, their emergence should be analyzed by agricultural RDI (research, development and innovation) institutions and organizations in the hemisphere to define how they affect their priorities and agendas.

In general, efforts are required by all actors, both public and private, to overcome the **connectivity** gaps, meet the need for **appropriate** digital developments for different types of producers in different regions, improve clarity in the regulation information **privacy**, and strengthen the **capacities** of producers, of other actors in agricultural chains and of agricultural support services, to develop and take advantage of options based on digital technologies.

FORAGRO (the Forum of the Americas for Agricultural Research and Technological Development) made a call for a virtual dialogue to analyze collaboratively and agree on the priorities that should be incorporated into the hemispheric RDI agenda, to achieve an inclusive and equitable use of digital agriculture, that leaves no one behind.

FORAGRO is an inclusive forum in which producer, civil society, research, extension, cooperation and all public, private and academic organizations of agricultural RDI systems can register as members of its Assembly. Due to its multi-sectoral nature and its focus on RDI, it is the ideal forum to achieve a participatory discussion and a joint positioning on the hemispheric RDI agenda in the face of growing rural digitalization.

Description of the consultation

The consultation took place over a 3-week period (September 16 – October 6) through virtual means. Interested participants requested registration through a Google Groups platform. As input for the discussions, the FORAGRO Executive Secretariat made available to the participants a brief technical note with background information on the subject (available at http://www.foragro.org/en/documentos/technical-brief-notes-digital-agriculture-challenges-and-opportunities). During each week, the following questions guided the discussions:

Week 1

- In your experience, do you consider that digital technologies are sufficiently accessible for agricultural producers, particularly for family farmers and the most vulnerable groups?

- Are there relevant tools and appropriate contents for the context in which you work?

- Are there limitations to the use of these technologies?

<u>Week 2</u>

- In your organization or institution, are topics related to digital agriculture being addressed? Which? In what way? For which target audience?

<u>Week 3</u>

- Please mention five critical issues that should be addressed and incorporated to the agenda of agriculture RDI organizations or institutions, in order to facilitate the use of digital technologies in agriculture in an inclusive manner. Please list the topics in order of priority.

The responses and comments obtained for each topic throughout the consultation are summarized below. The original contributions made by each participant will remain available in the consultation space: https://groups.google.com/forum/#!forum/consulta-virtual-foragro.

Results of the consultation

Current situation: Access, relevance and constraints

Access of agricultural producers, particularly family farmers and vulnerable groups, to digital technologies.

It is considered that digital technologies are not yet accessible to agricultural producers in general. The digital gap is still very wide, communication services (internet and telephone) do not yet cover all rural areas, the cost of equipment and connection is high, many remote areas are isolated and, when there is a connection, the service provided is of poor quality.

In addition to the lack of access for many people in rural areas, farmers usually lack knowledge about the available tools and how to take advantage of them, while the technical assistance they receive does not address these issues. The use and appropriation of technologies in the agricultural sector are considered very limited and restricted. In general, agriculture has lagged other sectors in the development and implementation of digital tools. Those belonging to the agricultural sector generally have a low level of education in computing, both in the case of medium and small producers, as well as the technical field staff.

Many decision makers have not internalized and prioritized these new technologies as necessary for sustainable rural development. A considerable number of agricultural research organizations do not yet consider the issue on their agendas. Farmers, especially those in family farming, are far from articulating in a positive and creative way to the processes of the technological revolution that are underway.

The participants highlighted the potential of digital transformation in family farming to contribute to issues such as increasing the quality, productivity and profitability of their agricultural products, as well as improving both the farmers' level of income and the wages for agricultural workers. The importance of digital agriculture was also cited to help achieve food security in a changing climate, while offering collateral benefits for environmental sustainability, nutrition and livelihoods.

Cellular penetration was mentioned as important in improving access and communication of rural residents. Examples from Peru were cited regarding the possibility of farmers communicating with insemination service providers and an agricultural information service via cell phone.

Relevance of tools or content for each context

Currently, work is being carried out to develop tools that could be implemented and scaled. Among the tools that were mentioned are: early warning systems for climatic risks and disasters, market information, e-commerce, systematization of block chains, unmanned aerial vehicles (drones), internet of things (IoT), artificial intelligence, precision agriculture, virtual training courses, real-time clinics, nano-computers for collecting and storing measurements, massive records or big data for, among many things, control of pests and diseases and weather information, as well as online information resources.

It was noted that many of the digital tools that are under development target mainly industrial export agriculture, characterized by abundant capital and the production of great volumes, and are not suitable for family farming.

Constraints to the use of digital technologies in agriculture

The participants mentioned limitations both for the use and for the development of digital technologies:

- Connectivity problems due to deficiencies in electrical systems, in telephone connectivity and, mainly, in internet access.
- High cost of services and equipment.
- Costos elevados de los equipos y de los servicios
- Lack of coverage and quality in communication and information technologies.
- Insufficient capacities and training for the use of educational platforms and devices (these are used more for leisure than as a work tool).
- Lack of digital culture and literacy in the agricultural sector (producers and technicians)
- Low level of schooling in general, as well as limited education in administration, business, finance, etc.
- Complex generational and regional differences, which are not fully resolved with training and education.
- Absence of public policies that promote agricultural and rural development, overcoming cultural, educational, economic and social constraints, and encourage the use of digital agriculture.
- Lack of integration between productive sectors.

Addressing issues related to digital agriculture

Digital technology issues are being addressed in different ways. A wide range of digital technologies are being adapted, studied or used for different purposes, but these experiences occur mostly in a reduced scale.

Implementation is carried out through training, support to farmers, production data collection, and development of specific tools, among other actions. Some examples shared during the consultation include:

- Inclusion of the topic in higher education curricula
- Meteorological, hydrological, market information services, early warning of risks and disasters, among others, in support of the rural sector.
- Training of small producers in digital tools, such as precision agriculture, use of mobile applications, monitoring of market price information, weather forecasting, among others, to reduce the technological gap.
- Use of nano computers to make measurements or massive records using big data, for pest control and follow-up of climatic phenomena.
- Use of cloud computing for information storage and sharing.
- Development of a "production lab" in which records of all the activities, changes and crop results are kept, and digital tools are used for analysis and decision making. This is the case of a family business that links agriculture and education, mainly aimed at small-scale women producers.
- Planning, implementation, execution and monitoring of clusters of inhabitants / producers to simplify, reduce costs and enhance the results of capacity building, with digital transformation as the focus.
- Development of digital traceability platforms to provide transparency throughout the production chain, such as the Integral Platform for Traceability and Sustainable Use of Fishery Products (Mexico), winner of the Innovagro 2018 award.

Critical issues that must be addressed to facilitate the use of digital technologies in agriculture in an inclusive manner

There were many priorities and critical issues described by the participants for an agenda that addresses the use of digital agriculture in an inclusive way. The proposals and recommendations received were then grouped into six thematic categories:

Coverage, quality and access to ICTs
- Expand rural connectivity with more coverage to reach areas that do not yet have access. This includes improving the coverage, quality and price of mobile telephony, as well as access to broadband internet in rural areas.
- Work in an integrated way with other sectors (communication, health, education, ...) to bring the available digital technologies to rural areas.
- Encourage public-private investment to create satellite connectivity networks and infrastructure to cover rural territories.
- Take advantage of the penetration of smartphones in rural areas and promote access to information, real-time data and mobile applications, among others.
- Promote and facilitate the supply, acquisition and use of the high-tech equipment used in digital agriculture, including the provision of credits for this purpose.

Public policies

- Raise awareness and involve the political class (at local, regional and national levels) to incorporate in their agendas actions to overcome limitations for the use of digital technologies for sustainable rural development.
- Generate State policies (not only agricultural or rural) to overcome cultural, educational, economic and social restrictions.
- Implement and improve public policies related to improving network connectivity in rural areas, training of producers and other actors related to the agricultural sector and facilitating and encouraging the implementation of digital agriculture in an inclusive manner.
- Generate, on the part of the public and private sectors, the conditions that allow the promotion and implementation of policies aimed at the activation and collective participation in digital agriculture and ICTs.

Capacities to take advantage of digital technologies

During the consultation, a great deal of emphasis was placed on the need for "digital literacy," that is, to strengthen capacities to take advantage of digital technologies at all levels. Some of the suggestions in this regard included:

- Close the technological gap by appropriating the producers in the management of digital tools, considering the farmers' culture and conditions, through training and rural extension.
- Include in the education centers, both at technical and university levels, everything related to digital agriculture and ICTs.
- Strengthen the capacities of extension workers (at professional, technical and farmer levels).
- Develop technical and institutional capacities to provide the necessary answers in agricultural and rural research and extension systems, with adequate human and technological infrastructure.
- Give young people technical training in the use of appropriate technologies for the agricultural sector, in order to generate the change and digital transformation that could allow a much more productive and competitive agriculture, with better opportunities for young people to prevent their migration to cities.

Development and promotion of digital technologies for agriculture

To guide the development and promotion of new technologies, participants made a series of recommendations:

- Plan, implement, execute and monitor correctly the technology development processes based on iteration, for the achievement of profitable small businesses.
- Promote the creation and development of new digital tools and the digital transformation of the sector with public and private investment, through technological acceleration programs, project incubators, entrepreneurship development, competitions, hackathons and investment awards, among others.

- Work with producers to design programs that incorporate the specific knowledge that farmers have, along with the knowledge of scientists and technicians.
- Procure digital systems and platforms that are increasingly user-friendly, especially for rural users.
- Establish thorough testing of new technologies: Analyze the infrastructure requirements and determine who can capture direct economic benefits, so that these technologies do not become another element of differentiation, displacement and exclusion.
- Define short-term plans, since technologies evolve rapidly.
- Do not consider the increase in productivity as the only objective: Contemplate the use of digital technologies for agroecological production or in the development of alert systems based on the observations of producers and youth.
- Promote and encourage digital entrepreneurship.
- Development of rural projects that include all production stakeholders, and lead small producers to have a sustainable business model

Extension and rural advisory services
- Develop tools that allow the articulation of producers' needs with researchers and specialists.
- Situate and comprehend the different regions, the local idiosyncrasy and the opportunities, when addressing technical assistance with new technological tools.
- Take advantage of these tools so that the extensionist or rural advisor becomes a facilitator and articulator between problems and solutions.
- Promote public-private investment to develop digital extension tools.
- Provide timely, digested and quickly accessible information through digital tools.
- Consider that mechanisms and people are the most important elements and that the tools should be to support them.
- Digital tools must be part of a national extension system, with research, development and promotion, and with good financing and equipment, in order to allow sustainable rural development, especially in the most vulnerable populations, in small farmers, and in traditional LAC communities

Agricultural research
Some elements that should be taken into account by agricultural research organizations regarding digital agriculture were mentioned, as well as some considerations regarding institutional and organizational changes

- Analyze the potential to generate impact of big data in smart agriculture, involving the entire supply chain.
- In research processes, consider sensors and devices that provide unprecedented decision-making capabilities.
- Take into account the changes caused by digital agriculture in the roles and power relations between traditional and non-traditional actors.
- Address data governance, including its ownership, privacy issues and security.

- Adopt a new paradigm on scientific and technological innovation, in which the role of implicit knowledge of producers and rural stakeholders is valued.
- Develop joint actions between research institutions and agricultural producer organizations, with new forms of governance between the public and private actions.

Integration and organizations

To better take advantage of the opportunities of the fourth industrial revolution in agriculture, participants mentioned several priority issues for the agenda related to intersectoral integration and stakeholder organization.

- Promote a general strategy for coordination and inter-institutional cooperation, which allows achieving more objectives and with greater impact on the rural population.
- Develop greater capacity for articulation with synergies between agriculture and other sectors of science and technology, economy, trade and education.
- Adopt a holistic approach, where not only actors related to agriculture intervene, but also education, science, financing and the private sector.
- Consider the regional dimension in the fourth industrial revolution and its regulation, which implies sharing information regionally.
- Promote an institutional and organizational change, involving institutional actors, as well as the social and economic actors of agricultural production and rural development.
- Foster the inclusion and structuring of small producers in cooperatives.