Digital Agriculture for Small-Scale Producers : Challenges and Opportunities

Mukam Augusta

Context (Problem and solution)

The Food and Agriculture Organization of the United Nations (FAO) reports that, compared to 2010 levels, global food production needs to increase by 70% prior to 2050 to feed the world's growing population, which is expected to reach between 9.4 and 10.2 billion by then. Meeting the food needs of the population is a challenge that is more likely to be met in Low-and middle income countries (LMICs) which expected to see the highest population increase but the **amount of arable land** is not increasing, **diets** are changing, **water demand** is rising, the **climate** is changing, and both the **environment and soil health** are under pressure, every where in the world but specially in those regions.

Digitization of the food system can enable greater efficiency, transparency, profitability, and equity for adressing those challenges. New innovations have appeared to help in this way like **sensors, Internet of Things (IoT), automation, Blockchain, artificial intelligence (AI), and computer vision**.

Pros and Cons

Pros

Digital agriculture means using digital technology and data to drive agricultural processes and decisions. It can help the entire agricultural sector be more efficient, transparent, productive, profitable, and responsible. In fact some advantages of the digitalization of the agriculture are :

- Agricultural advisory services
- Market linkages
- Financial services and insurance
- Agricultural research and development
- Sustainability and climate.

Cons

In many LMICs, most of the population is rural, and more than 70% of farmers are small-scale producers (SSPs). Then, while digital solutions can potentially improve the lives of millions of rural poor, there are fundamental barriers to adoption.Some limits are :

- Connectivity and access : Mobile Internet for SSPs is difficult in some regions
- Affordability : Smallholder farmers are financially constrained
- Literacy and skills : Many farmers in LMICs are not literate and technology skills are low
- Timely and relevant information : Relevance is one of the barriers to adoption of services.
- Data trust and security.

Some solutions are :

- **Hardware and architecture innovation**: Making solutions more affordable. Research is needed to design low-cost hardware architecture that is as functional as existing solutions ;
- **AI/ML, speech, and computer vision research**: Deriving relevant data. With dvances in computer science, we can detect crop stress; predict weather, yields, and outcomes; Many work remains to do ;
- **Networking, systems, and security research**: Connectivity, edge, data platforms. Farmers need low-cost Internet connectivity on their devices. The sensors, cameras, and other devices need connectivity on farms. However, existing solutions are very expensive. A key challenge is how to make high-speed Internet more affordable ;
- **Computer human interfaces**: Improving usability. To reach producers who are not very tech savvy, who typically have a feature phone, and who have literacy challenges, we need to look beyond a graphical user interface (GUI) .