



**WORLD FARMERS'
ORGANISATION**

ADOPTED BY WFO GENERAL ASSEMBLY
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**RESEARCH AND INNOVATION
FOR SUSTAINABLE AND
PRODUCTIVE AGRICULTURE
IN THE GLOBAL FOOD SYSTEMS**

Executive Summary

Innovation in Agriculture has been recognized as a crucial driver to improve the quality of productions and reach sustainability in all its dimensions, whereas maintaining productivity levels and farm income. Innovation does not equal technology. It is much more than that, especially in agriculture.

Innovation concerns products, processes, markets, institutions; it must be technological, social, and organisational.

Guiding Principles

Innovating the societal perception of farmers and agriculture

- **Farmers are not only food producers, they are stewards of natural resources and their place is at the heart of the society in rural areas,** creating jobs, spurring economic growth and providing knowledge.

Innovating the paradigms of innovation in agriculture

- **Innovation should be instrumental to farmers' knowledge and needs instead of being considered as an alternative or a mere one-fits-all solution.** Innovation in agriculture, starting from research, can only be **farmer - driven**, based on farmers' needs and knowledge.
- **This approach will foster the effective transformation of food systems through farmers led innovation. Once again, innovation must be farmers' driven and be guided by a bottom-up approach.**
- **Innovation must be inclusive: this means to be available and affordable for all farmers.**

Policy recommendations to foster a farmer-driven innovation in Agriculture

- Adopte an **innovative vision on farmers and Agriculture as a solution-oriented and multifunctional sector.**
- Shape and adopt a **farmer-driven Innovation approach.**
- **Empower Farmers' Organisations and cooperatives to effectively support farmers** in their innovation path.
- Increase **public and private investments in infrastructures to support innovation.**
- **Develop innovative finance and insurance models for Agriculture.**
- Build a solid and consistent **policy framework that unlock innovation in Agriculture.**
- **Develop new business models for data management that benefit farmers.**
- Develop new business models and technologies to **enhance farmers' position in the food systems at all levels.**
- **Innovate the way the food is perceived in nutrition & food education** policies taking into account that **agriculture and farmers play an essential and central role in ensuring the provision of healthy food for all.**

Preamble

Food security and the sustainability of the food systems transformation have gained a central role in global debates, first in relation with the 2030 Agenda for Sustainable Development and the achievement of the Sustainable Development Goals (SDGs). **Farmers are called to feed the world facing challenges at global, national and local level, such as:** a growing world population, the need to adapt to climate change, pandemic events, the urbanization and the loss of agricultural soil, biodiversity, fertility and the scarcity of water and other natural resources, the increase of the costs of production. The lack of property rights for many farmers and women farmers undermines the opportunity to innovate and grow.

In this context, **innovation has been recognized as a crucial driver** to improve the quality of productions and reach sustainability in all its dimensions, whereas maintaining productivity levels and farm income. **Innovation in Agriculture is a crosscutting line that encompasses all aspects of agricultural production and farmers' work.**

In other words, innovation does not equal technology. It is much more than that, especially in agriculture.

Innovation concerns products, processes, markets, institutions; it must be technological, social, and organisational.

Innovation can undoubtedly accelerate the transition towards sustainable food systems. It is therefore necessary to shape a conducive “innovation-framework” for farmers globally. Innovation-service models should first of all be crafted according to local contexts' characteristics, namely the level of digital readiness, climate vulnerability and business models, which are (or not) already present (e.g. private and/or public ones).

Guiding Principles

Innovating the societal perception of farmers and agriculture

Farmers are not only food producers, they are stewards of natural resources (soils, water, biodiversity, seeds), they manage and preserve landscape; **their place is at the heart of the society in rural areas**, creating jobs, spurring economic growth and providing knowledge. **Agriculture has the potential to contribute immensely to the adaptation and mitigation to climate change** through carbon sink, and farmers are already doing a lot towards sustainability¹ and they could do more with the right innovation developments, if the need for changes in the current approach to innovation would be addressed and the climate credentials of farmers pushed forward. Moreover, it emerges the need to disseminate sustainable agricultural practices to reduce the environmental impact of production. In this sense, **innovation is key to unlock the potential of agriculture as the heart of the functioning and transformation of food systems and this requires a participatory approach:** innovation is a system that consists of a wide range of public and private actors

¹ As an example, please have a look at The Climakers “Stories from the Field” Vol. 1, 2 and the COVID 19 Special edition, collecting Farmers' best practices already implemented to cope up with climate change <https://www.theclimakers.org/advocacy/#key>

and includes the rules and instruments by which these different stakeholders interact and relate with one another in social, political, economic and institutional settings.

This means that **innovation processes must be directed not only to what happens at the production level but involve all the stages of the food value chain and all the components of food systems.** In fact, while it is evident that farmers have a direct impact on the land they cultivate and the food they produce, all other actors of the value chain have a strong influence too: policy makers, inputs providers, investors and financing institutions, processors, retailers and consumers affect food supply and farmers' work with their choices, while power balances that underlie within all these actors shape the rules of production.

Innovating the paradigms of innovation in agriculture

Innovation in agriculture should serve as a way for farmers to improve their production patterns and support them in the achievement of the three dimensions of sustainability: economic, social and environmental. Innovation should be instrumental to farmers' knowledge and needs instead of being considered as an alternative or a mere one-fits-all solution: Farmers are innovators by both nature and necessity. They have always looked for better ways to manage their work, save time and resources and adapt to a changing environment. **Farmers do have the solutions because they have survived in each corner of the world for centuries.** Their wisdom, traditional knowledge, experience and expertise must be considered as the basis for innovations in agriculture. Traditional and local knowledge constitute practical experience that innovation could foster and help surviving. and thriving overall Starting from what farmers already implement on their farm every day, innovation can be the driver to boost those traditional practices (i.e fasten them up, scale them up etc.) or help farmers adapting those solutions to a changing framework as a consequence of many different challenges (i.e changes in seasons predictability ,invasive alien species, more aggressive pests etc.).

Innovation in agriculture, starting from research, can only be farmers' driven, based on farmers' needs and knowledge, for their benefit and the benefit of the natural ecosystem they work in. Research topics' identification, conception, design, implementation, dissemination and adoption should come from the involvement of local, sub-national, national, sub-regional, regional/continental and global Farmers' organisations, in order to be based on their real needs. If the strategy delivers on involving farmers, this could naturally lead to the effective adoption of innovations by the Farmers' community. **This approach will foster the effective transformation of food systems through farmers led innovation. Once again, innovation must be farmers' driven and be guided by a bottom-up approach.**

Innovation must be inclusive: this means to be available and affordable for all farmers, considering the characteristics of areas, rural territories as well as needs and "starting point" in terms of basic infrastructure, knowledge etc.

Innovation must also include ways of being competitive also in relation with the harmonization of associated regulations.

Main pillars for an innovative, farmer-centric, approach

Pre-requirements for a conducive innovation policy framework:

- **Basic infrastructures and Infrastructures that support the use of technologies:** In many Countries, both in developed, developing and less developed ones, there is a lack of basic infrastructures (i.e roads, sanitation, electrical power, storage facilities, market centre, telecommunication, digital connection, irrigation networks, schools and other social services) hampering the survival of many farmers and their families thus affecting the economic growth of agriculture in those territories.
- **Political support for agriculture:** Political support for agricultural development and innovation, catalysing Public Authorities' capacity to drive agriculture transformation is crucial.
- **Political stability and inclusiveness:** Farmers are still lacking possibilities to be involved in the decision making as they experience the biggest challenges in having access to land, education, finance and work; this is particularly true for women and young farmers. Clear property rights, planning reliability and political stability are a prerequisite for innovation. Investments in new technology and infrastructures are not interesting for farmers if there is no security concerning the land rights.
- **Innovative knowledge, training and education systems:** Development of systems (at all levels) facilitating access to knowledge and capacity building for farmers in a way that farmers themselves can learn from each other at peer – to – peer level. _Interactive innovation in this context consultancy/advisory services play a key role in knowledge transfer, knowledge exchange and knowledge flow for all actors in the agricultural sector. **The key for modern innovation is the development of network-based agricultural knowledge and innovation systems,** in such a way that each vertical agricultural sector is covered by the network. This result in an interdisciplinary flow of information, and communication (training, dissemination, support, etc.). Networking and dissemination help to break down the isolation of the individual actors and establish knowledge exchange between them, thus creating a cooperative network. It is essential to build on, use and develop existing already (national/regional/local) systems. A higher level of innovation networks is social networking. A holistic, i.e. complex, approach to innovation means looking at its functioning and the value it adds to innovation from an economic, sociological, psychological, and political perspective. It can be concluded from all from this: based on the above interactive innovation is an actor-oriented approach.
- **Farmers' Organisations and cooperatives to support farmers and innovation:** Farmers and Farmers' cooperative organisations can help closing the gap between farmers and the scientific and private sector, acting as catalysts of farmers' requirements and needs. They can act as intermediary between farmers and the public and private sector providing advisory services, innovation brokerage, training to farmers to raise their awareness and boost the adoption of innovations.

Climate-smart agriculture (CSA)

Climate-smart agriculture addresses climate change both on the mitigation and adaptation side. For a farmer, being climate-smart means adopting those practices that help coping up with the consequences of changing climate conditions, while reducing emissions. Biotechnology research must be allowed and supported by public organisations. It will provide farmers with solutions to climate and food production challenges.

Smart-farming and Precision Agriculture

Precision agriculture is not a technology *per se*, rather an innovative paradigm of which digitalisation is the enabling factor. Natural resources, especially water and soil, are essential for the functioning and structure of agricultural production systems and for the overall social and environmental sustainability. On the basis on these premises, a smart management of resources (soil, water, energy, inputs) is essential for farmers to ensure they can meet the global goal of food security in a sustainable way while also improving the profitability of their activity. **Innovative smart-farming solutions are needed to help farmers so we must ensure that those solutions are viable and farmers' friendly.** Smart farming includes smarter ways to utilise inputs at farm level. Farmers need to adapt their work to be climate-friendly and environmentally sustainable. At the same time, there is a broad consensus that the use of digital technologies will change agricultural production more deeply in the coming years. Digitalisation is instrumental in identifying the “language” that links technologies with what economic actors (farmers in particular) aim to do with different resources. Internet of Things, Artificial Intelligence, Machine learning have entered the debate around innovation in agriculture.

However, while Precision Agriculture tools have the potential to shape the sustainability of the agricultural sector in an effective way, their deployment puts several questions on the table, regarding the affordability and utilisation of those technologies by all types of farmers and the support needed to ensure that this happens. It is essential to understand if farmers are ready to adopt these technologies and what they need to do it and above all to create technologies built on the needs of the farmer and on his/her ability to use them. The first and fundamental principle must be that a solution is suitable for the farmers only if it is also economically viable. To be able to make full use of the advantages of smart farming, high-performance internet must be available region-wide.

Big Data and innovation in data management

Agriculture generates a large amount of data and technologies have increased the number of ways these data are collected. With digital technologies and the advent of Artificial Intelligence and machine learning's use in agriculture, we experience not only a collection of data by digital tools, but those data are processed and utilised to produce mapping and forecasts.

Farmers have rights to the data of their farm and they concern about “how their data are used” (lack of privacy, proper data licences, data-sharing, and also sharing of benefits), **which translates into a lack of trust.**

Innovative business models and technologies that strengthen the position of farmers in the overall agricultural sector and help building trust among actors

Too often, farmers stand in a weak bargaining position while the lack of trust among all the involved actors create a complex framework. This, coupled with the international complexity of the agricultural markets, makes it very complicated to the achievement of global sustainability.

Financing innovation in agriculture

Banking and financial institutions are key partners for the development of services that support farmers in innovation processes. However, they often lack a clear understanding of the agricultural business: Agriculture is a unique sector and should be treated as such when strategizing on financing agricultural activities. The risk factors inherent in agriculture often inhibit financial institutions from lending. These include risks linked to natural events (such as droughts, floods and pests) and farmers' ability to provide collateral (the offer of financial products may only be available to large-scale farmers with sound track records, and therefore may not be suitable for all types of farmers) and risks due to price volatility in the agricultural markets. As well, insurance schemes play an important role, most of all in relation to climate change and natural disasters that frequently occur at farm level.

Policy recommendations to foster a farmer-driven innovation in agriculture

1. Adopt an innovative vision on farmers and Agriculture as a solution-oriented and multifunctional sector

Innovation in the way farmers and agriculture are perceived at society and institutional levels is vital.

Farmers must be recognised as economic actors making decisions on the basis of investment and risk management strategies, to make sure that innovation in Agriculture include the farmers' perspectives through bold, daring and win-win partnerships.

At the same time, **it is important to find innovative communication tools that help shaping a positive thinking towards farming** to be recognised as a multifunctional economic sector directly impacting the health of people together with other food systems actors.

2. Shape and adopt a farmer-driven Innovation approach

Too often farmers are not involved in the strategic planning of research and innovation, sometimes not even consulted. That trend has resulted in a complete disconnection between the processes that lead to innovation and the adoption of innovation by farmers. While R&I is crucial to find and develop new technologies/practices, it is important that science partners up with farmers, in a completely reversed approach, assessing those solutions farmers are already successfully implementing on their farms in order to scale them up and improve them. **It is essential to understand if farmers are ready to adopt developed innovation and what they need to do it. Innovation must be built on the needs of the farmer and on his/her ability to implement it.**

It is moreover crucial to **embrace a systemic approach**: innovation strategies in all sectors of the agricultural value chain (seeds, fertilizers, crop management products) must put farmers at the centre to make sure that their knowledge and needs are taken into account.

3. Empower Farmers' Organisations and cooperatives to effectively support farmers in their innovation path

The role of farmers' organisations and cooperatives must be recognized and supported. They are key to first raise awareness among farmers members that is the main step in order for them to do their fundamental part to make of innovation a reality in all different territories and for all different kinds of farming businesses, by vocational training and advisory services to members. Farmers' organisations and cooperatives need to find innovative ways to better connect with farmers and external partners in order to create a powerful network to foster farmers' innovation.

4. Increase public and private investments in infrastructures

Public and private investments in infrastructures are needed to ensure that agriculture survives and feeds local communities including producers. It is essential that investments are channelled to build infrastructures for farmer - driven innovation, particularly technological and digital transformation, where needed, also to support breakthrough innovations with the potential to reach the remotest rural areas.

5. Develop innovative finance and insurance models

Innovating the managements of risks and understanding the opportunities of the agriculture sector is key for the development of any successful financial product directed to farmers. **Parameters and criteria for farmers' access to credit and insurance should be customized on the farming business with specific standards that may differ from the criteria applied to the other sectors.**

It is crucial that innovative financing models take into account the timing of the agricultural cycle. Thus, **it is important to highlight the necessity for farmers, individually or collectively through their representations, to be involved in the strategic planning of investments and the definition of suitable and flexible evaluation criteria.** Policy support is needed to incentivise financial institutions in providing loans to farmers with a fair use of collaterals, less requirements and less interests. Innovation in this domain could also support rural women farmers and their cooperatives.

It is vital to raise awareness among farmers of the importance of mitigating risks through insurances scheme and mutual funds, while incentivising insurances company in providing insurances to farmers. The use of technologies could help engage both farmers and insurers, giving precise and up to date information and mapping (i.e weather, crop and soil changes), helping farmers decide where to invest and insurer to know more precisely the risks linked to a specific insurance scheme.

6. Build a solid and consistent policy framework

Not only financial and investment support are required, but **also a policy framework that recognizes the role of agriculture as a business and a driver of rural growth and social transformation in rural areas, but also the diversity of farming contexts, situations and needs.** This support by governments is key to unleash the potential of agriculture as a multifunctional sector, to create that enabling environment for farmers to be central players in the food value chain.

7. Develop new business model for data management

It is of the utmost importance that new business models for data management take into account all the stages of agricultural data collection, processing and modelling in a way that benefits farmers. Farmers must be the **owners of their data** in all stages and the utilisation of data collected on farms and farmers' activities must be useful firstly for farmers and not only serving technological and input providers to improve their products. It is fundamental to address the possible obstacles in adopting new technologies linked to the use of data. **The lack of a proper data-governance system and rules based on transparency, and therefore trust, has to be tackled as well as the absence of a clear regulatory framework (also a legal one) concerning agri-data.** Overall, it is necessary to provide farmers with the means to manage and monitor their data to make better use of it, including easy access to affordable tools. Data, it should be always recalled, starts from the fields and it is in the fields that we must build an innovative, smart & digital ecosystem.

Farmers must give their consent before sharing their data and thus retain control over the uses of their data. To allow a good use of the agricultural data, the data generated on the farms must have guarantees of confidentiality. The anonymization of agricultural data will allow these guarantees of confidentiality.

8. Develop new business models and technologies to enhance farmers' position in the food systems at all levels

Reducing frauds, taking into account the challenge farmers face in coping up with global value chains and global competition is crucial. It is therefore essential to ensure that farmers are equipped with the right tools to play the game and ensure that they receive a fair share of value added in the supply chain. In this context, innovation in contract farming is needed to enable farmers to strengthen their bargaining power with buyers. **Farmers have to negotiate directly or through their organised structures with retailers the produce price before accessing the markets.** Moreover, viable technologies for the acquisition of precise market and prices information should be at the disposal of the farmers. **A policy framework that creates a strong and well-functioning ecosystem where farmers and contracting firms engage with each other on the same level should be guided by mutual benefits.**

9. Innovate the way the food is perceived in nutrition & food education policies

Farmers, consumers, policy makers and nutritionists should cooperate to make food production more transparent and to achieve healthy diets through innovative participatory policy models that recognise the need to innovate in education on food and take into account that agriculture and farmers play an essential and central role in ensuring the provision of healthy food for all.

We must educate the consumers about the way they perceive the sustainability cycle to foster consumer awareness and create the conditions for consumers to be willing to pay a premium price. Farmers and cooperatives are key to food security and for the well-functioning of value chains, from sustainable production to consumption of agricultural products.



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