Food and Agriculture Organization of the United Nations

Enhancing linkages between extension, research and producers through innovations

Why must we **enhance linkages** between research, extension and producers?

Closing agricultural production gaps between smallholder producers' actuals and the potential created by scientific research results and advancements is a vital if we are to address global challenges such as food insecurity, environmental degradation and climate changes. The gap is particularly large in developing countries where smallholder farming dominates the agricultural sectors. One of the many factors and constraints is the fact that researchers in universities and research institutions have no incentive or motivation to serve rural producers. This is due either to the systematic separation of research, extension and actual farming systems in most developing countries, or a lack of awareness about the importance of integrating these fields. The linkages must therefore be strengthened by innovative approaches that enable smallholders to achieve economic, environmental and social gains sustainably from agricultural science and technology research advancements.

To achieve greater coherency and complementarity of mission, goals and activities should promote regular and constructive exchange and collaboration between research, extension and producers.

What does this mean **in practice**?

Enhancing linkages between research and extension through innovations entails the following:

- Agricultural scientists are involved in promoting participatory technology innovations by working with producers and extension agents, with the support of public policy and private sector.
- Extension agents are empowered and work with producers and agricultural scientists in producer communities, facilitating participatory research, training and technology transfer and providing adequate demand-driven services to meet producers' practical needs and constraints.
- Producers and their organizations are empowered by participatory technology research, training and education, and thus appreciate and support technological innovations in reciprocal ways.
- The relevant actors are supported by enabling institutions.

Making it **happen**

The various linkages envisaged vary dependent on the local context, but the following steps based on successful past experiences could be followed.

Enabling and enhancing linkages between research, extension and producers through policy

This requires the creation of more enabling environments, involving supportive policies and institutions.

- Review current agricultural extension policies and lessons learned to develop a framework of agricultural extension policy reform to enhancing linkages between research and extension.
- Create policies and mechanisms to more explicitly promote linkages between research, extension and producers. This can be done through setting clear, more demand-driven, mandatory standards or criteria, and incentive schemes to jointly address demands and needs and solutions.
- Establish a coordination mechanism between research and extension: in many countries extension is located within the Ministry of Agriculture while research comes under the Ministry of Science or similar. This makes for cumbersome communication. A committee or working group including actors from diverse sectors is key to creating and maintaining linkages. It is also important to include state and private sector actors, (both in extension and research), NGOs, civil society, international research institutes operating in the country, and producers' representatives.
- Decision making at local level should favour the participation of all local stakeholders, including rural producers, and increase the responsiveness of research and extension to local conditions and demands. The decentralization of some functions can be a helpful factor.
- Introduce financial mechanisms to promote and support the commitment and coordinated participation of scientists, extension agents, producers and their organizations and private sector into joint actions in agricultural innovations.
- Establish strategic innovation platforms to facilitate dialogue at national and local level.

Pre-conditions for success:

While a linkage strategy is implemented, some basic pre-conditions are necessary for a successful transition towards demand-driven services in response to producers' practical needs and constraints.

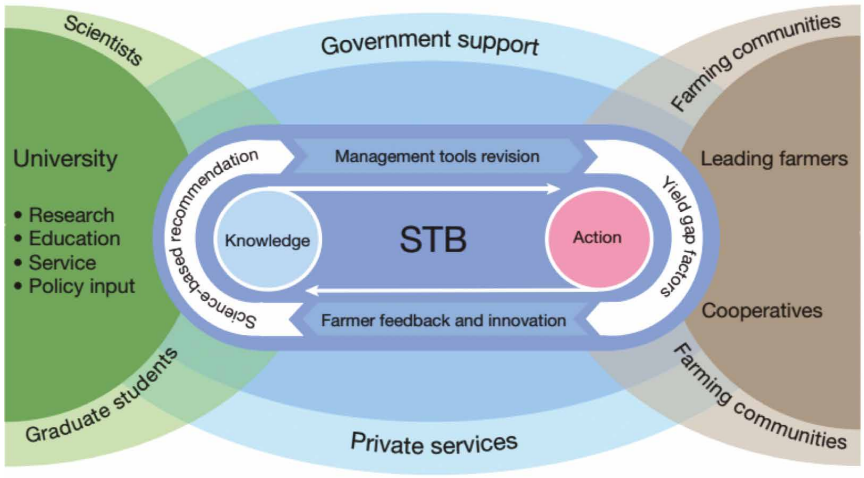
Government's commitment to the following principles:

- The recognition of and strengthening existing initiatives which promote linkages.
- Evaluation of research excellence based not only on academic criteria, but also on producers' demands and links with extension and advisory services (EAS).
- Building capacity on participatory research and extension approaches for staff of all sectors at all levels, supported by adequate funding and clear regulatory framework.
- Public funds for research and extension channeled through producers or their organizations, which manage them adequately and ensure research and extension services are demand-driven.
- Designing agricultural innovation systems based on the most recent scientific and technological advancements, with specific attainable goals and targets.
- Engaging private sector actors, including producers and their organizations, in the development of agricultural extension innovation systems, building and creating ownership among all.

Enhancing linkages between research and extension through innovations

- Conduct baseline surveys to review current producer management practices, knowledge and perceptions, to analyze and identify gaps between smallholders' reality and the potential offered by scientific research results and advancements.
- Promote participatory on-farm research and demonstrations conducted by researchers, extension agents and farmers' leaders to explore and demonstrate agricultural innovations.
- Sensitize producers to innovation, value their innovative potential and initiatives, and empower them to develop their own solutions alongside existing agricultural innovations.
- Develop skills of researchers and extensionists in facilitation and communication, working in partnership etc. These are essential when working with actors from different backgrounds and levels of literacy, as well as listening to producers and valuing their knowledge
- Empower researchers, extension agents and producers through training of trainers (TOT) courses and practical implementation of farmer field schools (FFS) on agricultural innovations.
- Establish necessary infrastructures and facilities, for example: science and technology backyard (STB), on-farm research fields, demonstration plots, farmer field schools etc. to host joint actions in agricultural innovations and their implementation.
- Review existing rural information dissemination and exchange system to enhance linkages, and build or enhance participatory and demand-driven services. Promote use of ICT and multi-stakeholder innovation platforms to support producers in innovating, and adopting innovations.

Concept model of the Science and Technology Backyard



Source: Zhang *et al.*, 2016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Example

Science and technology backyard (STB) is an example of a technical extension hub that connects the scientific, extension and farming communities to facilitate information exchange and agricultural innovations. Science-based management technologies are introduced by specialists and discussed with leading farmers, who provide feedback which is then addressed, resulting in farm-applicable recommendations. Through the hub, government public extension agencies and agri-businesses also improve their services. STB involves agricultural scientists and extension agents living in villages among farmers, advancing participatory innovation processes and technology transfer, and garnering public and private support. It was used to identify multifaceted production-limiting factors involving agronomic, infrastructural, and socioeconomic conditions, using participatory approaches. Farmers participated, finding and co-developing their own solutions and adopting agricultural innovations, thereby improving production outcomes. These interactions also help researchers and extensionists to better understand the reality on the ground and applicability and performance of proposed technologies.

Valuing the enhanced linkages between research and extension as means of improved accountability and sustainability

- Promote decision-making which combines bottom-up approaches to jointly plan, based on local conditions, with a more centralized process of identifying gaps and setting attainable goals and targets, so that needs of different stakeholders and regions are taken into account and prioritized.
- Institutionalize the enhancement of linkages between research and extension (for example: STB, FFS) with the integration of incentives for results-focused and accountable performance.
- Monitor, evaluate, and learn: appropriate evaluating and monitoring of current practices of enhancing linkages focused on learning and continuous improvement will ensure more effective, efficient and low costs services to farmers and society.
- Promote inclusive approaches to linkages for different groups such as scientists, graduates, extension agents, women, youth, elderly, and farmers with different levels of education.


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Example

In partnership with FAO, Benin, Uganda, Kenya and Lesotho initiated a **pilot programme in 2018**, whereby graduates from RUFORUM (Regional Universities Forum for Capacity Building in Agriculture in Africa) member universities (Benin, Uganda, Kenya and Lesotho) were selected to implement field projects. The focus of these projects ranged from animal health management to livestock and crop production, and from marketing to nutrition issues. For six months, they interacted with local farmers to share their academic work, exchange knowledge and develop innovative solutions for enhancing nutrition and food security. This aimed to improve sustainable agriculture and livestock production practices, strengthening collaborations along local food-value chains for rural income generation. With the guidance of their professors as mentors, they worked with farmers, traders, farmer associations, government agencies and rural institutions. Through these local enhanced linkages, the graduates received feedback from communities on their specific research areas. They also developed their practical skills, applying their research findings to their development-related field projects and generating innovative solutions for local farmers.

Useful resources

Zhang, W. *et al.* 2016. Closing yield gaps in China by empowering smallholder farmers. *Nature* 537, 671-674.

Jia, X. P. *et al.* 2013. Farmer's adoption of improved nitrogen management strategies in maize production in China: an experimental knowledge training. *J. Integr. Agric.* 12, 364-373.

Chen, X. *et al.* 2014. Producing more grain with lower environmental costs. *Nature* 514, 486-489.

MacMillan, T. & Benton, T. G. 2014. Agriculture: Engage farmers in research. *Nature* 509, 25-27.

Cui, Z. *et al.* 2018. Pursuing sustainable productivity with millions of smallholder farmers. *Nature* 555, 363-366.

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