

NOTE 13: Agricultural Innovation Systems

Compiled by: Rasheed Sulaiman V, August 2015

There is plenty of information available in the public domain that covers various aspects of extension and know-how about new methodologies for implementation. However this information is often scattered and presented in complex academic language. Hence practitioners, who often have very limited time and/or may only have basic formal education, find it difficult to make use of this information.

The Global Good Practices Initiative aims to bridge this gap by providing information about extension approaches and methods in easy-to-understand formats. As part of this effort, it makes "Good Practice Notes" available to all at www.betterextension.org. This Note contains one of the extension methods included in this series.

Introduction

Generating and applying new knowledge is important for all enterprises, including farming. But, quite often, new knowledge that can enhance productivity, competitiveness, and sustainability in farming is not widely adopted at scale. This lack of innovation in agriculture has led to the search for new frameworks such as 'innovation systems' that help in understanding how the process of agricultural innovation takes place and how its relevance and quality can be enhanced.

An innovation system is nothing more than a metaphor to help understand the process of innovation, and to help consider how capacities for innovation can be developed.¹ Though originally developed to understand industrial innovation, this framework has been increasingly used to understand the process of knowledge generation and use in agriculture. Recent research has resulted in new and better understanding of the structure and functions of the agricultural innovation system (AIS), which is defined as "a network of organisations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organisations into social and economic use, together with the institutions and policies that affect their innovative behaviour and performance".² This interactive system is made of individuals and organisations that demand and supply knowledge, as well as the policies and mechanisms that affect the way different agents interact to share, access, and exchange knowledge (Figure 1).

Under the AIS framework, innovation is not merely concerned with technical innovation (e.g. adoption of a better variety). It also includes organisational innovation

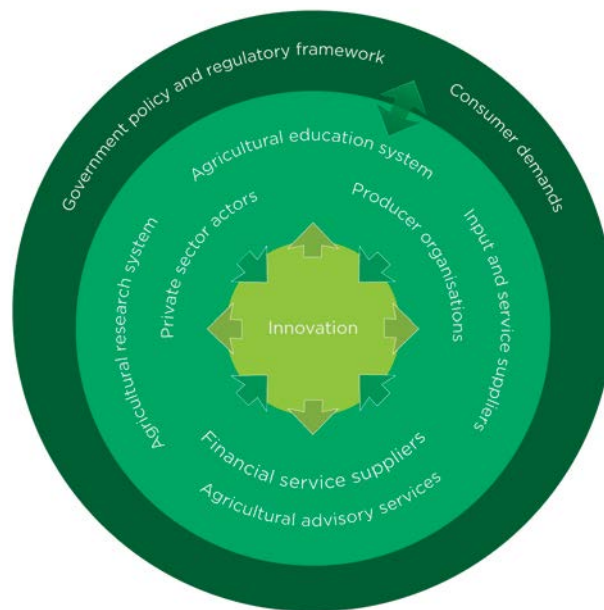


Figure 1. The Agricultural Innovation System.

Source: GFRAS 2015

(e.g. organisation of farmers as groups) and institutional innovation (e.g. addressing uncertainties in land leasing through policy changes). Donors and national governments currently recognise the importance of enhancing the capacity of all actors in the AIS instead of just research or extension. This arises from the realisation that neither research knowledge nor extension activities alone drive innovation. There is greater emphasis on investing in strengthening the capacity to innovate or the process through which different types of knowledge are combined to address specific issues.³

¹ Hall, A., Sulaiman, R., Beshah, T., Madzudo, E. and Puskur, R. 2009. Tools, principles or policies? Agricultural innovation systems capacity development. *Capacity.org*, Issue 37, September 2009.

² Hall, A., Janssen, W., Pehu, E. and Rajalahti, R. 2006. *Enhancing agricultural innovation: How to go beyond the strengthening of research systems*. Washington, DC: World Bank.

³ Hall, A., Rasheed Sulaiman, V. and Bezkorowajnyj, P. 2008. Reframing technical change. Livestock fodder scarcity revisited as innovation capacity scarcity: a conceptual framework. Hyderabad, India: UNU-MERIT and ILRI South Asia.



Philosophy and principles

The AIS framework recognises innovation as an interactive process. Central to the process are the *interactions* of different actors and their ideas; the *institutions* (the attitudes, habits, rules, laws, norms, practices, and ways of working) that shape how individuals and organisations interact; and *learning* as a means of evolving new arrangements specific to local contexts. While interaction among the actors within the innovation system is critical for innovation, several institutional and policy barriers generally constrain effective collaboration and knowledge flows among these different actors. Advocating for changes in institutions and policies is therefore critical for innovation. In other words, innovation requires enabling a combination of technological, organisational, institutional, and policy change.

Though research, education, and extension are key components of AIS, these are usually not sufficient to bring knowledge, technologies, and services to farmers and entrepreneurs.⁴ The idea of the AIS highlights the importance of a large number of other actors possessing different types of knowledge (e.g. farmer and industry associations, market intermediaries, consumer groups, policy-makers, certifying agencies, credit and input suppliers, etc.) and their effective interactions for innovation. The process of interaction usually needs to be facilitated, as actors often need an initial push or opportunity to break barriers that prevent joint discussion, action, sharing, and learning. Innovation arises in a particular socio-economic context and is shaped by the presence or absence of favourable conditions in which it can thrive; therefore, understanding this context is important to facilitate innovation.

Implementation

The AIS is increasingly recognised as a useful framework to diagnose innovation capacity, design investments, and organise interventions that appear most likely to promote agricultural innovation and equitable growth. The AIS framework can be applied at various levels: country, sector, or project/intervention level. However, most of the essential steps in using the AIS framework remain the same.

Diagnosing innovation capacity

For initiatives that focus on strengthening innovation capacity, diagnosis of the AIS is the starting point. A four element tool for diagnosing innovation capacity⁵ has been adapted and used in different contexts (Box 1). The four elements are:

1. **Actors and their roles:** What actors are relevant for agricultural innovation and what roles do they play? Are they sources of technical knowledge or engaged in value addition, output marketing, social mobilisation, institutional development, policy advocacy, coordination, or networking?

BOX 1: INNOVATION SYSTEM DIAGNOSIS: SMALLHOLDER DAIRYING IN BIHAR⁶

Smallholder dairying plays an important role in the socio-economic development of Bihar, a state in Eastern India. While several organisations exist for dairy development and there has been an increase in investment and interventions in this sector during the last decade, these are yet to contribute to increased milk productivity. Diagnosis of the AIS clearly revealed the diversity of organisations that need to be engaged to promote smallholder dairying. Clearly the sector needs coordination and collaboration among this wide range of actors. This is not easy considering the low level of trust among actors, low morale of veterinarians, the tradition of working independently, and weak capacities for coordination. Synergies are lacking between agricultural/livestock policy objectives and the programmes of relevant organisations outside it (such as industry, health, education, research, skill development). The diagnosis recommended addressing this policy incoherence by organising a multi-stakeholder policy working group (to address policy gaps, enhance capacities for policy implementation and facilitate policy learning) as the first step in enhancing the innovation capacity of this sector.

2. **Patterns of interaction that exist between different players:** Are certain actors better connected? Are key organisations isolated or well integrated into the wider set of activities and organisation in the system? How are these organisations linked?
3. **Institutions:** What are the habits, practices, traditions, and routines that cause organisations to behave the way they do with respect to how well they link? Do patterns of social, economic, and political power influence the way organisations work and how does this impact patterns of interaction?
4. **Enabling environment:** What are the key technical, policy, marketing, and environmental challenges and opportunities being faced? Are there science and technology policies to promote collaboration, to promote application of knowledge? How far do the different actors shape or influence the policy processes?

Facilitating interactions and knowledge flows among the selected actors

The diagnosis of an AIS provides insights on the nature of barriers that constrain interaction and the opportunities that could be strengthened to promote interaction. There are several ways to promote interaction.

- **Innovation platforms:** Innovation platforms are increasingly used to bring different actors together to discuss and negotiate collective or coordinated action.⁷ They comprise various actors who communicate,

⁴ World Bank. 2012. *Agricultural innovation systems: An investment sourcebook*. Washington DC: The World Bank.

⁵ Hall et al. 2006. Op. cit.

⁶ Sulaiman, R.V. and Vamsidhar Reddy, T.S. 2015. *Policy incoherence in smallholder dairying in Bihar*. ILRI Discussion Paper 33. Nairobi, Kenya: International Livestock Research Institute (ILRI).

⁷ Posthumus, H. and Wongtschowski, M. 2014. *Innovation platforms*. Note 1, GFRAS Good Practice Notes for Extension and Advisory Services. Lindau, Switzerland: GFRAS.

cooperate, and carry out activities needed for innovation to occur. Platforms can exist at multiple levels. Local platforms tend to address specific problems or opportunities such as improving the efficiency of a specific value chain. Platforms at national or regional levels often set the agenda for agricultural development and allow stakeholders, including farmers through their representatives, to influence policies. Several such platforms were set up under the aegis of the Forum for Agricultural Research in Africa and DFID's Research Into Use programme in Africa.⁸

- **Innovation brokering:** Any advisory service or related individual or organisation can broker, connecting farmers to service providers and other actors in the agricultural food chain. Recent years have witnessed greater interest in investing in innovation brokering. Innovation brokering differs from traditional extension and research because it represents the institutionalisation of the facilitation role, with a broad, systemic, multi-actor, innovation systems perspective.⁹
- **Innovation grants:** Funding (competitive grants/ matching grants) is often used to incentivise collaboration and joint action among different actors in the AIS. For instance, in India, the National Agricultural Innovation Project funded promising multi-stakeholder consortiums and research alliances comprising organisations from the public, private, and non-government organisation (NGO) sector through a competitive process. The consortium members were jointly responsible for governance, design, and implementation of these programmes. Similarly, the Food & Business Applied Research Fund of the Netherlands provides grants for applied research contributing to innovation for food security and private sector development only to consortia having local practitioners and researchers.
- **Innovation management:** Innovation involves a wide range of functions, activities, and tools performed by agencies that work through platforms, alliances, or partnerships, collectively referred to as innovation management. While facilitating access to technology is important in putting new research-derived knowledge into use, it has value only when it is bundled together with other innovation-management tasks (Table 1).¹⁰ Identifying the right actors with different capacities is important for enabling innovation.

Facilitating policy changes

- **Policy working groups:** Accelerating institutional and policy changes is critical for innovation. Organising policy working groups comprising key policy influencers around a specific theme can help in accelerating policy changes that enable innovation. Working groups can also help bridge knowledge–practice–policy gaps through a shared understanding of the role of different

Table 1. Innovation management tasks observed in Research Into Use Asia projects

Functions	Actions	Tools
Networking and partnership-building	Convening	Grain cash seed bank
Setting up/strengthening user groups	Brokering	Community-based seed producer groups
Training	Facilitating	Community-based user groups
Advocacy for institutional and policy change	Coaching	Producer companies
Enhance access to technology, expertise, markets, credit, and inputs	Advocating	NGO-led private companies
Reflective learning	Disseminating information	Market-chain analysis
		Market planning committees
		Community germplasm orchards
		Village crop fairs
		Food-processing parks
		Use of lead entrepreneurs

actors and facilitate development of coherence around different policy instruments.

- **Sector coordination agencies:** Coordination and collective action are important for innovation. In many countries, organisations for coordination at the national level exist (e.g. apex research councils and commodity boards). Though they rarely coordinate activities of actors or prioritise investments for innovation, they could play a useful role, if adequately capacitated.
- **Innovation support facility:** In situations where the national agencies lack the mandate and capacity for coordinated action for innovation, new structures or facilities to support innovation must be established. Such facilities should have a national mandate and adequate funding. The facility should have capacity to govern the wide range of stakeholders, experiment with different approaches, monitor and evaluate outcomes, assess impacts, influence policies, and support learning. The Agricultural Research and Development Support Facility established in Papua New Guinea is a good example of this type of facility.¹¹

Extension and AIS

Extension and advisory services (EAS) are integral to the AIS. The great value of the AIS framework for extension is that it allows the role and organisation of extension to be understood as part of a wider canvas of actors, processes, institutions, and policies that are critical for innovation. EAS could better contribute to the process of innovation if they would expand their conventional technology transfer role by including more functions, especially related to facilitation, brokering, and enhancing the capacity of the actors in the AIS to provide integrated support to farmers.¹² EAS could support the innovation process by:

- organising producers and the rural poor and building their capacities to deal with production, natural resource management and marketing challenges, and also promoting farmer-to-farmer exchange of information

⁸ Ibid.

⁹ Klerxx, L. and Glidemacher, P. 2012. The role of innovation brokers in agricultural innovation systems. In: *Agricultural innovation systems: an investment source book*. Washington DC: The World Bank.

¹⁰ Sulaiman, V.R., Hall, A. and Vamsidhar Reddy, T.S. 2014. Innovation management: a new framework for enabling agricultural innovation. *Productivity*, 55 (2): 140–148.

¹¹ Mbabu, A.N. and Hall, A. (eds). 2012. *Capacity building for agricultural research for development lessons from practice in Papua New Guinea*. Maastricht, The Netherlands: UNU-MERIT.

¹² Rasheed Sulaiman, V. 2012. Extension-Plus: new roles for extension and advisory services. In: *Agricultural innovation systems: an investment source book*. Washington DC: The World Bank.



- building coalitions or platforms to facilitate development of consortia of different organisations to address specific issues (e.g. value chain development, participatory irrigation management, etc.) and also for information sharing and learning.

This means that EAS would have to interact and partner with a wide range of organisations dealing with markets, policy, financing, and also with sources of technical knowledge. But to play these roles it needs new capacities at different levels.¹³

Strength and weaknesses

Strengths

- AIS explicitly recognises the complementary knowledge and expertise held by different actors and the importance of combining different types of knowledge (technical, institutional, policy, etc.) through facilitated interactions for innovation to happen.
- AIS highlights the existence and importance of several types of innovation processes and the importance of institutional and policy changes that facilitate innovation processes.
- For EAS, the application of AIS is helping them to widen the role from an agency for technology delivery to an enabler of innovation processes.

Weaknesses

- The AIS framework presents and recognises a diversity of approaches to be experimented and adapted for innovation, but it is not a blueprint for organising innovation in agriculture, even though it is often considered as such.
- There has been a tendency to 'cherry pick' innovation system ideas such as innovation platforms, public-private partnerships, etc. and apply the concept to existing transfer-of-technology type of initiatives, without considering the institutional and policy reforms and learning and capacity development ideas inherent to the AIS framework.
- Competencies needed for facilitating interactions among different actors within AIS are often scarce and many funders are unwilling to invest in such intangible capacity development efforts, which yield impact over the medium or long-term.
- In general, operational skills in managing innovation such as facilitation, brokering, and relationship building are in short supply and there are not enough professionals who can coach those interested in piloting and learning from AIS approaches.

Potential impact

While there is an increasing appreciation of the AIS framework and many organisations are interested in using it, there is little progress on using these ideas holistically to reform agricultural innovation arrangements. Governments can play an important role in creating

enabling conditions for agricultural innovation through coordination, promoting horizontal and interactive working approaches, strengthening knowledge management, and creating networks for managing partnerships.¹⁴

As the focus of AIS is on accelerating institutional and policy changes that enhance the capacity for innovation, the impact of AIS has to be ideally evaluated on these changes. Research on understanding and attributing impact of AIS is in progress. Though there are many ways to monitor and evaluate the impact of these changes, capacities to experiment with interventions and monitor, evaluate, and learn from the results of these experiments have to be built among the actors in the AIS.

Training materials

e-Institute for Development E-learning course on Agricultural Innovation Systems (AIS), World Bank Group <http://worldbank.mrooms.net/course/view.php?id=791>

Further reading

Nederlof, S., Wongtschowski, M. and van der Lee, F. (eds). 2011. *Putting heads together: agricultural innovation platforms in practice*. Bulletin 396. Amsterdam, The Netherlands: KIT Publishers.

Rajalahti, R., Janssen, W. and Pehu, E. 2008. *Agricultural innovation systems: from diagnostics toward operational practices*. Agricultural and Rural Development Discussion Paper 38. Washington DC: The World Bank.

Reaching Rural Women website: www.reachingruralwomen.org

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¹³ Rasheed Sulaiman, V. and Davis, K. 2012. *The new extensionist: roles, strategies and capacities to strengthen extension and advisory services*. GFRAS Position Paper. Lindau, Switzerland: GFRAS.

¹⁴ IICA. 2014. *Innovation in agriculture: a key process for sustainable development*. Institutional position paper. San Jose, Costa Rica: Inter American Institute for Cooperation on Agriculture.