



Assessment of Agricultural Innovation Systems (AIS) A contribution to developing STI roadmaps for SDGs

Background

Developing Science, Technology and Innovation (STI) roadmaps for SDGs in low- and middle-income countries requires particular attention to agriculture, given the sector's importance for food security and nutrition, employment, national income as well as environmental impacts. The traits and performance of agricultural innovation systems (AIS) need to be well understood to inform an STI agenda that effectively integrates and strengthens the agricultural sector.

Despite recognising the importance of innovation to agricultural transformation, countries in tropical and sub-tropical areas tend to have weak innovation capacities, for a number of reasons. A technology or product view of innovation dominates and aspects of innovation that relate to new processes and new forms of organisation are often overlooked. A linear technology-transfer mindset is common in the agricultural sector and many actors, including policy makers, are not well acquainted with the innovation systems model. The Tropical Agriculture Platform (TAP), a G20 initiative to develop national capacities for agricultural innovation in the tropics, is addressing this problem. By bridging the current capacity gap, TAP paves the way for agricultural innovation that meets the demands of small-scale farmers, small and medium enterprises, and consumers.

TAP sees AIS as a system with four main components: research and education; business and enterprise; bridging institutions; and the enabling environment. A dynamic interaction among these multiple actors, facilitated by multi-stakeholder processes, can unleash innovation. Conversely, policy constraints, capacity gaps, structural and other shortcomings may hinder innovation, thus preventing countries from realising their potential for agricultural innovation.

AIS perspectives depart from the conventional technology-transfer model where technologies are conveyed to farmers via the agricultural extension and advisory system. Rather, the AIS concept acknowledges that innovation is a dynamic process that involves multi-stakeholder interactions. TAP puts emphasis on developing the 'soft skills' that are part of the AIS, such as capacity to: navigate complexity; collaborate; reflect and learn; and engage in strategic and political processes.

Key messages

- **Innovation** is key for the agricultural transformation to meet key SDGs. Insights into innovation processes in the agricultural sector can contribute to a country's broader STI agenda and roadmap for SDGs.
- The **Tropical Agriculture Platform** (TAP), a G20 initiative, has developed an approach and a set of tools to strengthen country innovation capacities, in particular functional capacities or 'soft skills': the TAP Common Framework on capacity development for Agricultural Innovation Systems (AIS).
- An **assessment of a country's AIS** provides evidence for appropriate decisions on policies, strategies and investments.
- An **analysis framework for assessing AIS**, developed by FAO, is being tested during 2021 in nine countries. The assessments are part of a project for scaling up TAP tools, methods and guidelines, financed by the European Union under the Development Smart Innovation through Research in Agriculture (DeSiRA) initiative.
- This policy brief presents the **methodology for assessing AIS** and some experiences and lessons learned on how to identify gaps in AIS and agree on actions for improving capacities and policies for agricultural innovation.
- The AIS assessment results, presented in a country profile, can facilitate **policy dialogue and priority setting for investments** in the agriculture and food sector and can be integrated into the national STI roadmaps for SDGs.

This shift in paradigm is gradually entering agricultural organisations, policies and programmes; a process that TAP facilitates via four-year work plans, jointly implemented by TAP partners. Accordingly, the EU-supported TAP has developed and tested a methodology for strengthening AIS at country level: *the TAP Common Framework on capacity development for AIS* (TAP, 2016). Since 2015, the TAP Common Framework has been used in 15 countries in Africa, Asia-Pacific and Latin America and the Caribbean. The experiences and lessons learned, synthesised across countries, are used to further refine and scale up the TAP approach and tools. Since mid-2019, this is done in the TAP-AIS project, *Developing capacities in agricultural innovation systems: scaling up the Tropical Agriculture Platform framework*, coordinated by FAO's Research and Extension Unit of the Office of Innovation (FAO, 2021).

The TAP-AIS project gathers evidence on the current situation of a country's AIS through an **assessment**, using a participatory methodology developed by FAO and its partners. This policy brief introduces the AIS assessment methodology and indicates how results can be used to strengthen innovation capacities, support policy dialogue and guide investment decisions on agricultural innovation at local, national and regional levels. The outputs of the AIS assessment can be used to identify priorities of the agriculture and food sector that should be integrated into the STI roadmaps for SDGs.

Assessment of agricultural innovation systems

Agricultural Innovation System (AIS) is defined as a network of actors (individuals, organizations and enterprises, supporting institutions) together with policies in the agricultural and related sectors that bring existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way these actors interact, generate, share and use knowledge as well as jointly learn. To illustrate and facilitate communication on this perspective, TAP developed a conceptual model of the AIS, its components and the interaction between them (Figure 1). Furthermore, the model highlights that the AIS interacts with a country's broader STI system.

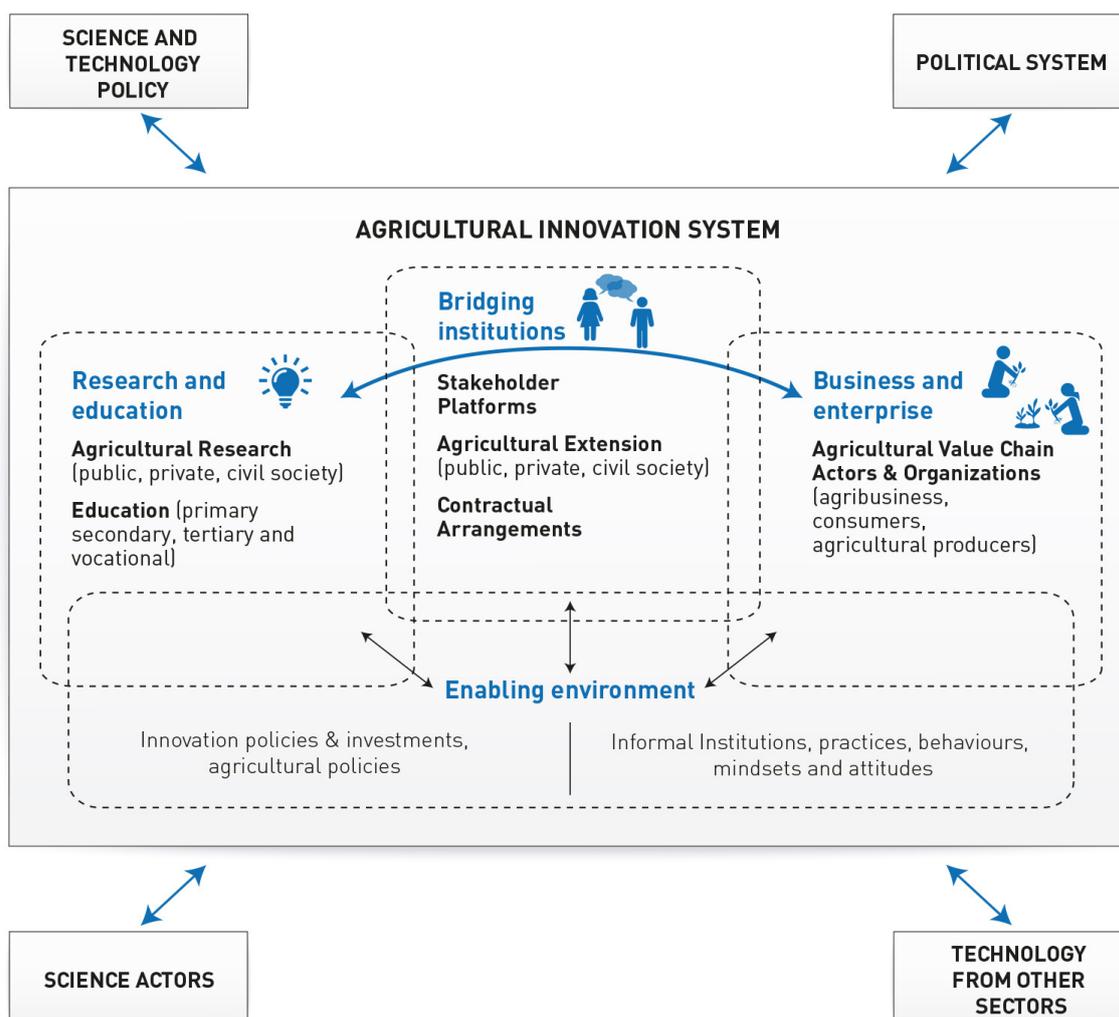


Figure 1. Conceptual diagram of an agricultural innovation system (TAP 2016)



This model is also a pedagogic starting point for an assessment of AIS, which asks questions such as:

- What broad functions of the system actually make innovation happen?
- How well do these functions perform and what are the underlying causes of their performance related to structures of networks of actors, their capacities and factors in the enabling environment?
- What are the major challenges in the AIS to be addressed?
- What specific actions should be taken to strengthen the AIS?

Target audience

An AIS assessment is conducted in a participatory and reflective manner, engaging stakeholders such as:

- Policy- and decision-makers, providing insights on the role of innovation and agricultural policies and the enabling environment overall in advancing innovation.
- Public organizations, NGOs and private-sector organizations in agriculture and food systems.
- Local actors and organisations (innovators) providing insights and feedback on how the innovation system works on the ground.
- Universities and research organisations.
- Businesses and entrepreneurs.

Four-steps for assessing agricultural innovation systems

The AIS assessment cycle involves preparation, an effective assessment, and an action and out-reach phase that integrates results into the national policy process and development agenda.

The preparation places the assessment within the national context. National leadership – e.g. from the Ministry of Agriculture – is important to guide the assessment, set relevant objectives and mobilise the resources required. The scope of the assessment and its objectives are adapted to the country context and to the expectations of key actors in the national AIS. This aligns the assessment to political priorities for the agricultural sector, and more broadly for STI, providing information and evidence that guide decision-making. A scoping study can help to identify entry points for the assessment while raising awareness and expectations among stakeholders. A team is also created and trained on the AIS assessment approach and tools.

The assessment describes the national AIS from a broad range of perspectives, including analyses of functions, structures and capacities of the innovation system, and of the enabling environment. Both quantitative and qualitative tools are used, with emphasis on the latter. Participatory multi-stakeholder dialogue is in focus from start to finish. A range of analytical tools are available: selecting and adapting them to fit the assessment objectives and scope is an important initial task for the AIS assessment team. The challenges and constraints, as well as opportunities revealed during the assessment, help the team to make well-informed recommendations on improvement of the system. These are validated by the stakeholders and an agenda for action is developed.

The out-reach phase communicates assessment results with various audiences to raise awareness on key issues and trigger actions that improve the performance of the AIS. For example, specific actions may cover policy dialogue and influencing the policy-making process, capacity development interventions at various levels, and advice on priorities for investments that strengthen the AIS.

The analytical framework for the AIS assessment is a four-step methodology, as illustrated in Figure 2, based on:

1. Analysis of functions: A small set of case studies are used to analyze innovation processes in the country's agriculture and food sector. The case studies should cover different kinds of innovation and involve a wide range of stakeholders from local to national level – the innovation actors. Participatory tools such as focus groups and interviews with key informants are used to explore how innovation actually happens and what functions are involved. Taken together, the case studies are a proxy of the functioning of the national AIS. This analysis begins to reveal the enabling and hindering factors behind the innovation process.

2. Analysis of the underlying causes of performance: In the analytical framework, the performance of various functions of the AIS is explained by the combined effects of the structure of the stakeholder network involved, the joint capacity of these actors, and the conditions given in the enabling environment in which they operate. As such, the structural analysis highlights issues of interaction, collaboration, influence and alignment among a variety of organizations. A rapid capacity

analysis reveals the strengths and weakness regarding technical and functional capacities from local to national level. Analysis of the external environment provides insights on enabling and hindering factors for innovation related to policy and legal frameworks, institutions and cultural aspects. In practice, these various analyses may be combined during interviews, surveys and workshops.

3. Consolidated analysis of results: The analyses in steps 1 and 2 are likely to produce a long list of gaps, constraints, challenges and opportunities that characterise the national AIS. Step 3 provides the consolidated analysis of these results across all studies. The urgency and importance are also examined in the light of national priorities and broader context, to help set priorities. This step also involves a capacity gap analysis, which uses expert opinion to assess the capacity of the national system to address these challenges.

4. Developing an agenda for action: The final step of an AIS assessment is seeking to match the constraints and challenges with the potential solutions available. The options for problem solving are analysed to make sure that recommendations are realistic and action-oriented. An agenda and roadmap for strengthening AIS is then prepared. A validation workshop with key stakeholders to review the recommendations and agenda for actions is an important part of this step. The resulting AIS roadmap may cover capacity development of specific organisations and platforms, support for a policy dialogue process as well as specific investments that would strengthen capacities of the national AIS.



Figure 2. Analytical framework for assessing agricultural innovation systems

Emerging insights from AIS assessments in project countries

FAO is collaborating with the governments in nine countries to assess their AIS, supported by the aforementioned TAP-AIS Project. As of April 2021, this work is in progress but some glimpses from the process may highlight how this tool is being used.

The scope of an assessment can be broad, looking at the national AIS in general, or it can be narrowed down to focus on a sub-sector. The latter is happening in Rwanda where the assessment focuses on the small-livestock subsector – poultry, piggery and small ruminants. Consultations with stakeholders and the project's country advisory team found that, in this way, the project could align with Rwanda's National Livestock Master Plan and strengthen a national platform on small livestock, which is in an early stage of development. The AIS assessment will advise on specific action to develop capacities of key organisations in the small livestock sub-sector, as well as strengthening policy dialogue.

Well-chosen case studies for observing the innovation process are the starting point for an assessment. These will reveal on how innovation actually happens in the field and will identify enabling and constraining factors of different kinds. In Malawi, for example, three case studies have been selected: the Horticultural Innovation Platform in Bvumbwe, Thyolo district, Fall Army Worm (FAW) management using Farmer Field Schools in Balaka and Mzimba districts, and the livestock pass-on programme in Ntchisi and Thyolo districts. All cases will be analysed with a special focus on the role of District Agricultural Extension Services to spur agricultural innovations in Malawi. Results from the case studies will then be consolidated at the system level as a basis for understanding Malawi's AIS more broadly and identifying actions to strengthen it.

The enabling environment influences all individuals and organisations in an agricultural innovation process and is therefore one of the key elements of the AIS assessment. In Lao PDR, the study found that the concept of an 'Agricultural Innovation System' is not clearly recognized in current government policy or strategy. Coordination and collaboration, especially cross-sectoral coordination and among development projects, is weak. Regarding infrastructure, producers have poor access to transport and logistics, and facilities for processing, storage and cooling systems, whilst, with respect to institutional arrangements and management, legal advisory services for farmers are needed (e.g. advice on contracts). These results will be discussed with policy makers, with a view to improving conditions for innovation.

Conclusions and emerging policy recommendations

Insights into the agricultural sector innovation processes can contribute to a country's much broader STI agenda and roadmap for SDGs. This is particularly relevant in low- and middle-income countries in the tropics, most of which have a large rural population and significant agricultural contribution to the GDP.

Innovation is widely recognised as an important aspect of the agricultural transformation which is required to meet key SDGs. However, according to studies by TAP, capacities for such innovation tend to be weak. In particular, there is a gap in terms of functional capacities or 'soft skill' – e.g. capacity to collaborate and to engage in strategic and political process, associated with the innovation processes.

Experts under the TAP have developed an approach and a set of tools and guidelines for countries to use to strengthen their capacities. Since 2015, it has been introduced in a number of countries worldwide, as well as in several regional research and extension networks. The further refinement and scaling up of the TAP Common Framework continues, as experiences and lessons become available.

An assessment of a country's AIS brings awareness of how the system works, its weakness and challenges, and its strengths and opportunities for improvement. It provides evidence that guides policy- and decision-making regarding policy processes, strategies or investments. However, few countries have conducted such assessments in an organised manner, and the adoption of the concept and approach of AIS is still work in progress.

FAO's Research and Extension Unit of the Office of Innovation has recently developed an analysis framework for assessment of AIS. In 2021, this methodology is being tested in nine countries (Cambodia, Lao PDR, Pakistan, Eritrea, Rwanda, Burkina Faso, Senegal, Malawi and Colombia). This policy brief introduces a four-step methodology for assessing AIS and presents early experiences and results that can guide future capacity-development interventions (the assessments are ongoing).

The early results indicate a number of challenges that impede innovation. For example, collaboration between agricultural research, extension services and farmers/farmer organizations is limited and, where it exists, is still dominated by a traditional linear approach. Shortage of qualified staff in government research and extension departments, insufficient investments, and inadequate functional capacities are some of the constraints to agricultural innovation in many countries.

Robust policy recommendations based on the findings of the AIS assessment are being developed for each country – some of the emerging recommendations include:

- Create platforms that bring stakeholders together around the innovation including products, processes or forms of organisation;
- Increase consumer-orientation in the innovation process to add socio-economic value that customers are willing to pay for;
- Develop facilitation skills at local level (district/province) to support and strengthen local innovation partnerships;
- Promote dialogue with government department responsible for taxation, to address the constraints to innovation; and
- Review and update policies for agricultural research and extension services to better integrate the concept of AIS.



Further reading

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Contact

Research and Extension Unit
Office of Innovation (OIN)
OINR-Chief@fao.org

Food and Agriculture Organization of the United Nations,
Rome, Italy



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