MODULE 7

Assessing, Prioritizing, Monitoring, and Evaluating Agricultural Innovation Systems

OVERVIEW

Helen Hambly Odame, University of Guelph
Andy Hall, LINK Ltd.
Kumuda Dorai, LINK Ltd.

EXECUTIVE SUMMARY

The rationale for investing in assessment, priority setting, monitoring, and evaluation within an innovation system is that practitioners require information for short- and long-term decision making and for managing limited resources effectively within complex, nonlinear processes of technical and institutional change that seek to achieve social, economic, and environmental goals. Change is rarely managed by following a set plan. Instead, information on technical adaptations (*what gets done*) as well as institutional adaptations (policy and organizational changes) involving *how things get done* must be continuously sourced, shared, analyzed and used to inform decision making at multiple levels of the system.

This module examines processes to inform decision making and manage innovation at four generally defined levels of the innovation system for agriculture: policy, investment, organization, and intervention. The module identifies methods relevant at each level for assessing, prioritizing, monitoring, and evaluating innovation processes. For example, at the policy level, international and cross-sectoral comparative analyses may be used (such as benchmarking) and combined with multistakeholder policy dialogues and foresighting studies to inform on future development issues or subsectors. At the organizational level, methods include multi-institutional and organizational performance assessments involving innovation surveys and network mapping. At the level of specific programs or interventions, assessment tools for strengthening the involvement of end-users or farmers in value chains include gender analysis and support for self-organizing networks, among others. Still other methods are relevant at all levels of the innovation system for effective performance management, accompanied by reporting arrangements that ensure accountability.

RATIONALE

In innovation systems, managing depends on information-rich tasks such as assessment, monitoring, and evaluation, which are vital to maintaining learning, performance, and accountability (box 7.1). Decision makers, including investors, public service managers, entrepreneurs, scientists, and primary producers, easily understand the need to identify technical information that can be used to create new products and services. Equally essential—but far more difficult to obtain, analyze, and make accessible—is information about institutional adaptations (organizational and policy changes) that are being made or need to be made within the innovation system before technical innovations can be realized. For this reason, individuals and organizations who are concerned with performance management, learning, and accountability within the AIS will need to learn how to obtain and use information.

Box 7.1 Main Terms Used in This Module

Accountability. A transparent management system that ensures participation and open communication and reporting on results obtained and inputs used to achieve the results.

Assessment. Making decisions about innovation to know *why* investment is necessary to transform modes of production and consumption. Assessment is also done to speed the search function within innovation systems (for example, to identify new, more sustainable, and more equitable routes to value creation in agriculture).

Decision making. Decision making is not centralized but occurs throughout the system. Rather than limiting the focus to any single line of inquiry or information source, interactive learning feeds decision making and requires individuals and groups to be open to different and imaginative ways of thinking as well as to be receptive to new ideas and directions that match the context.

Priorities. The areas to which internal and external resources will be allocated to address problems or take advantage of opportunities.

Performance. Results in the form of productivity (outputs), outcomes, and impact, measured (for example, with indicators using quantitative or qualitative data) in relation to mandate, strategy, objectives, and client needs.

Theory of change or ***intervention logic.*** The underlying assumptions in an intervention that link intervention inputs with expected outcomes.

Monitoring. Tracking progress in stimulating changes in the policy and institutional environment; internal to an intervention and learning-based.

Evaluation. Performed on behalf of the investor to gauge the effectiveness of the design and execution of the intervention supported by the investor and the observed impacts associated with it. Evaluation is also done to inform the intervention logic of new investments.

Information gathering. The collection, communication, analysis, and reporting of quantitative and qualitative data by various stakeholders, which makes it possible to assess: priorities, capacities, and performance; components within the system, such as institutions, partnerships, and interventions; or the system's resources (human, financial, physical, and other resources).

Source: Authors.

Tasks such as assessing, prioritizing, monitoring, and evaluation will be widely used across the system and by a range of stakeholders. For instance, donors and community leaders may be concerned with tasks such as evaluating social and economic outcomes from past agricultural innovation. Scientists and public planners compile data and analyses of future trends and priorities and monitor indicators of change within the system. Entrepreneurs may track returns to current project investments and farmers may assess value chains of specific interest to them as producers. Efforts are also made to connect all types of decision makers within the system to meet their shared need for information and intelligence about their current context. No single organization or type of organization can provide the knowledge needed to inform policy, set priorities, or propose interventions. Monitoring can facilitate midstream adjustments, while evaluation at the final stages of an intervention enables outcomes and impacts to be thoroughly investigated to inform future investment decisions and negotiation among stakeholders.

Today, the responsibilities of decision making and managing innovations are spread across a range of actors at different levels of the innovation system. It is important to recognize that each of these levels requires different investments, and while coordination may still occur, it is rare for a single, centralized agency to be responsible for assessment, priority setting, monitoring, and evaluation within the AIS. These levels, which are useful for organizing the discussion in the rest of this overview, include the following:

- ***Policy level.*** At this level, the actors are responsible for creating the enabling environment for innovation (see module 6). At this level, decision making and management emphasize coherence across sectors, scenario development, and benchmarking innovation capacities.
- ***Investment level.*** At this level, the actors are responsible for designing and prioritizing interventions that support innovation. Decision making and management emphasize evaluating the performance of investments and testing the underlying assumptions that shed light on the "why" question for new investments.

- ***Organizational level.*** At this level, the actors are responsible for ensuring relevance to the wider innovation system. Decision making and management emphasize assessing organizational performance and understanding the shifting landscape of other organizations and networks in the innovation systems.
- ***Intervention level.*** At this level, the actors are responsible for managing and implementing innovation processes and resources to achieve desired social and economic goals. Decision making and management emphasize efforts such as monitoring the effectiveness of actions in achieving intervention goals, understanding the dynamic context in which interventions take place and planning around it, and understanding unexpected outcomes.

The "how to" approach for identifying innovation priorities and assessing performance described in this module includes tasks that are familiar to policy makers and managers of science, technology, and innovation, including strategic planning and foresighting, organizational performance assessment, monitoring, evaluation, and impact assessment. These familiar management processes and tools are being adapted to the new demands of a multistakeholder innovation system, however, and being supplemented with interactive learning to gather information on the institutional dimensions of innovation processes and capacities. Examples of these adapted and new tools are discussed throughout this module.

PAST EXPERIENCE

Past agricultural R&D systems traditionally placed great emphasis on gathering information about inputs into or outputs from the agricultural research process, prioritizing where those input investments should be made, listing outputs produced, and gathering information about the outcomes of research that typically combined different outputs and led, for example, to changes in an important agricultural commodity's yield and wider social and economic impact. Investments to gather information on inputs and outputs made it possible to validate technology adoption, investigate the economic surplus generated by research and compute rates of return, and inform economic studies of the contribution of research to impact (Pardey, Alston, and Ruttan 2010).

Historically innovation was oriented toward a linear "technology push" model that focused heavily on R&D, and decision making and management largely were orchestrated by centralized bodies. In agricultural development, national governments predominantly made decisions—constituted as public policies—that directed investment into priority areas (often commodity research programs). In the era that preceded AIS thinking, policy and planning tools commonly resulted in R&D programs and projects that operated with defined resources and specific time scales (table 7.1). Centralized public R&D planning was challenged, however, to respond to constant changes in demand-driven value chains, where decision making and management were decentralized. Entrepreneurs and primary producers became key to processes of assessing existing policy and managing performance within the system. This evolution suggests that innovation systems for agriculture are increasingly more difficult to design, plan, and implement without mechanisms to ensure that rapid adjustments can be made in "game-changing" situations, such as the emergence of new fundamental information, dramatic shifts in resource availability, or demands from new or different stakeholders.

While the basic elements of policy making and planning have not disappeared altogether in an AIS, the need to adapt to uncertainty and appreciate complexity have given rise to greater skepticism about causality and control in policy and planning cycles (Edquist 1997). In an AIS, decision makers are required to be strategic and not just fund and operationalize strategic plans, then monitor and evaluate them. Rather than determining a final set of priorities, planning becomes an iterative process that continuously identifies and (re)prioritizes actions in response to the rapidly changing environment. In an AIS context, the conventional notion of a fixed-purpose or time-bound plan of action must anticipate new information and learning generated through stakeholder interactions, monitoring, and eventually evaluation of results. The move beyond past agricultural policy making and planning methods is most evident when it comes to monitoring and evaluation, which are now understood within the AIS to be distinct tasks with different responsibilities, tools, and time frames (TNs 4 and 5).

KEY POLICY ISSUES

For policy making, priority setting, and performance management in the AIS, key policy issues involve allocating sufficient resources to information gathering and assessments. These activities will help identify opportunities that impinge on the AIS (including those that are nonagricultural) and strategies for ensuring that learning from very localized as well as large-scale interventions can become more useful to individual stakeholders as well as to the AIS as a whole.

Table 7.1 Conventional Agricultural Policy Making and Planning Tools

Tool	Description and time frame	Advantages	Disadvantages and challenges
Strategic planning	Defines direction of change and operational objectives (4–8 years); emphasis on efficiency and relevance.	Creates sense of direction that aligns the organization to its environment.	Operational demands may detract from strategic planning.
Master planning	Define long-term investments and activities (10 years).	Determines major system and organizational activities in relation to financial investment.	Limited with respect to redefining the organization in relation to changes in its environment.
Program planning	Prioritized actions to address constraints (3–5 years).	Systematically analyzes constraints and identifies priorities *before* resource gaps analyzed and projects developed, which is relevant to request funding and negotiate with investors.	Investors may impose new priorities on existing programming, making it difficult to fulfill original program objectives.
Project planning	Define efficient and sufficient set of activities to overcome a "problem" (1–3 years).	Identifies and prepares an integrated plan to resolve a "problem." This integration translates a project idea into a proposal and also ensures that planning integrates monitoring and evaluation operations.	Lack of necessary resources challenges project planning, monitoring, and evaluation. Proposals may have immutable deadlines.
Experiment planning	Develop best option to obtain insight into a scientific question (1 year or less).	Identifies the most efficient and effective option, in the form of research proposals, for achieving research results.	Research ideas often arise and become proposals to respond to investor calls or changing stakeholder demands without sufficient attention to fair and equal treatment within the organization.
Financial planning	Match financial availability to needs (variable).	Develops annual budgets and strategies to identify and develop alternative sources for an organization's core and operational funding.	Needs to ensure a link to project monitoring and evaluation to respond to low-performing activities and rebalance resources with programs.
Human resource and training plans	Efficiently manage and develop human resources (variable).	Analyzes capacity-building needs and prepares to develop knowledge, attitudes, and skills of individuals in an organization.	Needs to ensure a link to project monitoring and evaluation to respond to low-performing individuals, redirect training efforts, and rebalance human resources with programs.
Priority setting	Final stage of planning that defines an investment portfolio that is consistent with national policy and development goals, organizational mission, and program objectives.	Rationalizes investment in relation to limited resources, external demands for transparency, and focus on client needs.	Implementation can deviate from agreed priorities. Priorities set without explicit support of key stakeholders and program staff can lead to conflict in the organization.

Source: Authors; Gijsbers et al. 2000; Alston et al. 1995.

A supportive fiscal environment that values assessing, prioritizing, monitoring, and evaluating AIS and ensures information access

Within public institutions, management tasks associated with information, knowledge, and learning are often squeezed into already tight budgets for financing R&D and innovation (Hall and Learner 2010). Allocating sufficient funding for information management should also ensure access to more and better information. For example, production data in developing countries are notoriously unreliable, and food stock data around the world are highly secretive. Releasing research results or making information such as price and market data widely accessible using a range of communication strategies and media can facilitate access to information that could otherwise be scanty or overwhelming and difficult to sort out. Information accessible to one stakeholder group may not necessarily benefit another, so resources are also needed to assess users' information needs.

It is also appropriate for the public sector to play a key role in mobilizing information for policy, priorities, and performance management in AIS and making this information as widely accessible as possible. Public agencies, such as universities, research institutes, and government departments, can collect, analyze, and communicate information about the AIS, making it available not just to their own networks but to wider professional or producer associations, media agencies, private sector groups, and others. An exam-

ple of such an initiative is the use of foresighting and scenario planning exercises (TN 3). Furthermore, governments can encourage participation by the private sector, recognizing that proprietary rights may be associated with information sharing among enterprises. Efforts to make as much information publicly available as possible have led to important contributions to technical and institutional innovations (module 5 discusses incentives and resources for innovative partnerships and business development; module 6 covers intellectual property management; and module 1 focuses on coordination and collective action among AIS stakeholders.)

Information on agricultural and nonagricultural opportunities

Although policy making, priority setting, and performance management in an AIS depend on information about interventions with the expected links to agriculture (such as interventions that will raise agricultural productivity), information about the productivity of crucial nonagricultural sectors and linkages to new product markets is also relevant to information-gathering efforts in the AIS. Innovation policy (see TN 1 in module 6) generally needs to include a link between agricultural and nonagricultural economic strategies for resource-poor households—for example, by supporting sustainable agricultural intensification while developing manufacturing and services that will expand nonagricultural employment.

Balancing potentially competing priorities within the wider innovation system requires dedication to information-intensive tasks such as benchmarking. The identification of multipurpose infrastructure or multitasking capacities that are useful to agriculture and transferable to nonagricultural sectors will provide a wider set of options in the innovation system. One example of multipurpose infrastructure is rural infrastructure for information and communication technologies, which can improve flows of agricultural information within and among organizations in addition to performing a multitude of other functions (for an overview, see World Bank 2011).

End-user participation and scaling up information from the local level

Within an AIS, an end-user perspective in processes such as assessment and priority-setting is developed by bringing innovation users' collaboration, behavior, and perceptions of change to bear on the analysis of the system. Baseline data about end users, including farmers, is essential to identify indicators of future performance and impact. Participatory methods of problem analysis such as Most Significant Change (TN 4) or mapping exercises (IAP 2) supplement baseline data and provide end users' critiques of their own situations and past interventions. Such information collection and exchange ensures that all stakeholders are better informed as decision makers by developing intelligence on key information and trends.

Even so, analysis generated about technical and institutional innovations at the end user or local level is often difficult to combine and compare across different temporal, spatial, and need-specific contexts. This requires generic tools for assessing, prioritizing, monitoring, and evaluating innovation processes to be carefully selected and adapted to fit as closely as possible with prevailing social, cultural, political, economic and environmental contexts (see the cases of India in IAP 4 and Chile in IAP 5). For the same reasons, within a country, planning efforts and results from monitoring and evaluating local innovations are not necessarily easily scaled up to constitute national priorities or policy. Policy making and setting priorities will have limited success unless the complex of local circumstances and decision making among stakeholders is taken into account. Rather than trying to gather and compare information about all local interventions, strategies for assessment that compare selected cases of local adaptation and innovation, preferably involving regional or international benchmarking, can be used (see TN 1). The key point is for the end user or local innovation processes not to be overly generalized, and for all stakeholders to be active collaborators within AIS assessment, priority setting, monitoring and evaluation to ensure learning, performance management, and accountability.

NEW DIRECTIONS, PRIORITIES, AND REQUIREMENTS

Innovation systems are developing new management processes which question underlying assumptions and theories of action to reconsider the sustainability of systems that were perhaps no longer effective and relevant in the changed context. Managers within innovation systems now must be equipped to deal with change and not simply administer under changing circumstances. As a result, new emphasis is placed on, for example, defining alternate scenarios and strategies that could influence or create opportunities for technical and institutional innovation. Such methods seek to redefine organizational mandates while ensuring participation and open communication about results

obtained from past inputs used to achieve the results. Over the long run, high-performing innovation systems establish internal management processes that can define objectives and indicators of success and can achieve and communicate results while being attentive to resource constraints. In contrast to the past, especially in agricultural R&D, when priority-setting exercises and planning instruments (and their requirements for M&E) were largely mandatory and often static exercises, management tasks within the innovation system are ineffective and irrelevant unless they are established as dynamic processes.

The thematic notes and innovative activity profiles in this module provide more depth on the processes and methods undertaken at these four levels. The overlap among the levels is substantial, but it is useful to highlight the purpose and roles of each level, what is being assessed, and what tools are used for setting innovation priorities and assessing performance (table 7.2).

Examples of key directions for future assessment, priority setting, monitoring, and evaluation at different levels of the AIS include the following:

- ***Policy level: Benchmarking innovation capacity.*** Managers and investors increasingly need to benchmark the performance of sectors and subsectors in terms of the capacity developed for innovation through innovation system interventions. International investors may also use benchmarking to make international comparisons to track macro-level progress and help target subsectors, sectors, and countries for investment in capacity strengthening or for other investments that are conditional on certain levels of capacity. Methodological challenges need to be addressed, however, in measuring and comparing context-specific and systemic capacities of this sort. (See TNs 1 and 4 in this module and TN 1 in module 6.)
- ***Investment program level: Foresighting.*** Investment implies committing support to a program of activity to gain a desired return. Projections of future investments needed within an innovation system will benefit from collaborative diagnostic tools such as foresighting. Stakeholder engagement and learning that can lead to technical and institutional changes are facilitated through

Table 7.2 Decision Making and Management Processes and Tools at Different Levels of an Agricultural Innovation System

Level	Stakeholders involved	Key management processes	Tools (related TN/IAP)
Policy	National policy makers, sector committees	– Track progress of the national system and its functions – Coordinate agriculture with other sectors (modules 1 and 6) – Inform global or regional public policy networks – Design an enabling environment (intellectual property, banking, pricing, and tax regimes) (module 6)	– Benchmarking (TN 1) – Innovation surveys (TN 2) – Foresighting and scenario planning (TN 3, IAP 1)
Investment program	Finance ministry, donors, private sector, technical team leaders	– Prioritize and allocate resources – Identify new investment opportunities or bottlenecks – Review effectiveness of past investments – Improve underlying theories of change (intervention logic) of new investments	– Diagnostic studies with a commodity or subsector focus (TN 3, IAP 5) – Benchmarking (TNs 1 and 4) – Evaluation and impact assessment (TN 5)
Organization	Executive officers, board of directors, research organizations, extension organizations	– Assess organizational performance (TN 2) – Set organizational policy and program priorities – Enable organizational and institutional learning and change (module 4, TN 5) – Respond to changing innovation landscape	– Performance indicators (TN 2) – Innovation surveys (TN 2) – Self-organizing networks (IAP 4) – Evaluation and impact assessment (TN 5) – Institutional histories (TN 4) – Network mapping (IAP 2) – Reflexive monitoring in action (TN 4) – Causal process tracing (TN 4)
Intervention	Nongovernmental organizations, private sector, research and extension program leaders, project managers	– Accountability to investors – Managing effectiveness of program/project implementation – Managing innovation processes, including effectiveness of networks, interactions, and ways of working – Testing and reframing theories of change (intervention logic) – Responding to unexpected outcomes – Responding to changing innovation environments	– Participatory impact pathway analysis – Outcome mapping (TN 4) – Gender analysis of value chains (IAP 3) – Rapid appraisal of agricultural knowledge systems (TN 4) – Stakeholder analysis (IAP2) – Most significant change analysis

Source: Authors.

foresighting processes. Foresighting involves systematically looking at the long-term horizon of science, technology, and institutions within dynamic economic, political, and social contexts to identify strategies that will yield the greatest benefits. (See TN 3 and IAPs 4 and 5.)

- ***Organizational level: Institutional assessment.*** Investment in an AIS anticipates technical innovation as well as institutional changes involving policy, program, and project implementation (how and when) and resources employed (who, what, and where) to obtain the highest possible potential for impact. Institutional assessments use multiple methods to capture existing and potential changes within and among organizations and their strategic activities. (See TN 2.)
- ***Intervention level: Interactive visualization methods for learning, action-oriented planning, monitoring, and evaluation.*** Actors and organizations in innovation systems are drawing on information from a wide range of sources, often using multiple methods. Tools that involve interaction, such as outcome mapping or Net-Map, are used to gather and synthesize information and generate new knowledge. These methods generate qualitative data and are used together with more traditional quantitative analysis and diagnostic case studies to enable learning that will improve the prospects for interventions to provide the best possible return on investment. Monitoring allows for mid-stream adjustments that can optimize performance while evaluation leads to better accountability reporting and negotiation for future decision making. These two crucial innovation management processes can inform one to the other, but they are distinct processes with respect to learning, performance management, and accountability. (See TNs 4 and 5 and IAPs 6 and 7.)

MONITORING AND EVALUATION

The development of an AIS requires continuous decision making and management to obtain critical information to answer critical questions. For example, how have policy and investment in innovation processes achieved or surpassed their objectives? How do stakeholders know that resources for innovation are being allocated and managed effectively? What lessons about institutional adaptations are informing new technical changes? And finally, how can assessments strategically inform future decision making and interventions?

In effect, the act of assessing, prioritizing, monitoring, and evaluating within the AIS is a reflexive practice that catalyzes the experience-based learning that underlies all technical and institutional innovation. Aside from the more detailed discussion of M&E in this module, the notion of revitalizing the way in which monitoring and evaluation are distinctly needed to inform learning, performance management, and accountability is a common thread in all of the themes covered by the modules in this sourcebook.