National Agricultural Research Systems: Focus on Sustainability

With its direct effect on productivity, agricultural research ranks among the key factors driving growth in agriculture. In large borrowing countries, such as India, some one-third of the rise in agricultural productivity over the past 20 years has come from contributions made by research. Agricultural growth in turn raises rural incomes, reduces poverty, and spurs economic development more broadly. Public investment in agricultural research is thus both warranted and necessary. That is why World Bank assistance to national agricultural research systems (NARSs) has been increasing since the mid 1960s. Yet, the increasing pressures on fiscal budgets in developing countries have put many of the public research systems at risk.

The Bank’s lending experience shows three factors to be essential for preserving the research systems: borrower appreciation of the nature of agricultural research and of its role in economic growth, appropriate research planning and operational efficiency, and the relevance of research priorities. A recent OED review* of World Bank lending for agricultural research finds that in all three areas improvements are needed. While Bank interventions helped to expand capacities, they gave too little attention to the sustainability of the systems at a time of increasingly scarce government funds. In particular, farmer participation and recognition of stakeholder needs—keys to ensuring the relevance of research priorities—have still to be adequately integrated into national research systems. The study recommends making greater use of economic analysis to assist in setting research priorities, emphasizing the importance of agriculture and agricultural research in country assistance strategies and policy dialogues to strengthen borrower willingness to fund research, and strengthening monitoring and evaluation to facilitate research planning and accountability.

Bank lending to research

Guided by the 1980 Agricultural Research Systems: Sector Policy Paper, the Bank’s assistance to agricultural research increased significantly over the 1980-95 period, averaging $200 million annually in the 1990s compared with $150 million in the decade before. The Bank is now the major external source of funding of agricultural research in developing countries. The increase in Bank funding, however, has come within a steadily shrinking agricultural portfolio (from 31 to 14 percent of the Bank’s total lending over the same period). As a result, the importance of agricultural research in the overall agricultural portfolio has grown.

Because of the weak capacities of most of the research systems in the assisted countries, Bank lending during 1980-95 focused mostly on capacity building. Sixty-one percent of the Bank’s commitment to research during the period went to free-standing projects, aimed mostly at strengthening and expanding the capacities of particular agencies. In human resource development, for example, projects strongly supported post-graduate training and recruitment. These efforts helped close skill gaps and reduce dependency of the systems on expatriate scientists. About 45 percent of total Bank funds went to expanding the research infrastructure of agencies through civil works, purchase of new equipment, and strengthening of research libraries. Although all regions benefited from increased Bank support, the emphasis in funding shifted from Asia and Latin America and the Caribbean to Africa, where most economies still rely heavily on agriculture and the need for food security surpasses those of other regions.

During this time, the Bank also expanded its support for international research by

- increasing funding of the Consultative Group on International Agricultural Research (CGIAR), an organization in which the Bank has had a leadership role;

Box 1: Regional research initiatives in Africa

The Special Program for African Agricultural Research (SPAAR) was established in 1985 as an informal group to improve donor coordination and collaboration in support of agricultural research in Sub-Saharan Africa. In 1990 SPAAR launched a special initiative to increase agricultural productivity through regional research. The initiative included adopting new modes of cooperation based on the principle of comparative advantage. Four regional frameworks of action were developed and are being implemented. Early experience from the implementation of the plans highlighted six factors for successful national research systems:

1. research plans of action:
2. financing mechanisms to ensure reliable, timely funding for the implementation of the plan:
3. management and institutional capacity to implement the plan and to be accountable for the budget:
4. a management advisory group comprising all the stakeholders to advise on the work program:
5. effective links among research, extension services, and farmers:
6. strong links with regional and international research institutions.

- mobilizing donor support for the creation of the Special Program for African Agricultural Research (SPAAR) to strengthen research systems through regional efforts and greater donor coordination (see Box 1); and
- helping to promote cooperation among different actors in the global research community.

The OED study examined the Bank's agricultural research portfolio in 32 countries and reviewed research project components in 8 other countries for the period 1977-92. Of the completed and evaluated free-standing projects, 72 percent were rated satisfactory, better than the Bank's average of 63 percent for agricultural sector projects as a whole. But even among the successful projects, long-term viability was often doubtful. Sustainability of research investments thus emerged as a key issue. Also important, and linked to sustainability, were issues of research management and efficiency and the choice of research priorities in NARS establishments.

Long-term concerns

Funding

In all countries where the Bank is helping to strengthen agricultural research agencies, the contribution of agriculture to GDP, employment, and export income is high. Yet shortages of funds have made governments reluctant to spend on public research. Although governments have supported expanding agricultural research systems, in most cases, they have done so with substantial loan or grant assistance. Particularly in Africa, the Bank and donors have provided the full operating costs of some research programs. Even when agency budgets are approved, delays in release of funding are common, which shows policymakers often have an inadequate understanding of the nature (especially the gestation) of scientific research in rural industries.

During the review period, both the number and quality of staffing of assisted research institutions expanded considerably, but financing of research operations did not keep pace. Funding per researcher declined in most countries, and salaries consumed an unhealthy share of recurrent funding.

Institutional efficiency and research planning

From the mid 1980s the Bank increased its attention to research management and planning in public agricultural research systems. The intention was to make research more responsive to national priorities and to the differing needs of diverse agroecological regions and farming communities. Some initiatives attempted to introduce need-based planning techniques for research recruitment and training. Several research centers introduced information management systems to improve financial management and monitoring (though these have still to become fully functional). Particularly important, substantial progress was made in incorporating consideration of research outcomes in long-term national development programs and in determining implications of policy on different commodity groups. These initiatives provided a significant start to a more rational planning process. They also necessitated improved coordination.

Accordingly, the Bank promoted the strengthening of apex coordinating institutions, and where that was infeasible, the installation of similar bodies within the dominant group of research agencies. Among the groups where such institutions were established, better coordination facilitated the development of national research strategies, improved program planning and procedures, and developed interagency links for efficient allocation of resources.

But planning remained weak, particularly in setting research priorities and linking the priorities for technology improvements to available resources. Two factors contributed to this weakness: insufficient appreciation of economic analysis in research planning and scarcity of indigenous economic expertise in most national research systems. By exempting project appraisal and preparation from including estimates of economic rates of return for research investments, the Bank also may have indirectly strengthened the tendency to underestimate the value of economic analysis. But in determining the most cost-effective use of resources for research, there is no substitute for economic assessment. And with the use of simplified techniques for measuring economic surplus, even small agencies can conduct such assessments (see Box 2).

Poor integration of research planning at state and federal levels and

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among institutions also posed problems, leading to wasteful overlap. Moreover, many of the improved planning initiatives were developed by external entities, and a good portion of the associated analytical work was done by foreign consultants. Consequently, “ownership” of research master plans among the agencies was not uniformly strong.

Relevance of technology

Relevance determines how quickly users adopt new or adapted technology, hence how quickly new technology translates into increased productivity. The best way to ensure relevance is to strengthen the links among research, extension, and farmer communities, including increasing the involvement of women, who are especially important in smallholder farming.

Nearly all Bank-supported research projects during 1977-92 included components to strengthen these links and to make research demand driven and focused on the needs of smallholder farmers, especially those working in the more difficult production environments. The components varied from on-farm research to organization of regular meetings between research and extension staff to adoption of farming system perspectives. They aimed at informing researchers of the constraints and potentials of the main farming systems and at facilitating the adaptation of technology to those circumstances.

While projects substantially expanded on-farm research, the full potential of the approach remains to be realized. One reason is that on-farm research is one of the first areas to suffer during funding cuts; another is that farm trials often replicate work done in experiment stations instead of working to adapt the technology to the circumstances of farmers.

Since the late 1980s, the Bank has consistently adopted a farming system perspective in its agricultural research projects (along with the use of socioeconomic considerations in planning and review processes). The approach is necessary for making research more responsive to smallholders; it is also important for ensuring that the traditional emphasis on commodity research adjusts to the technological needs of the more diversified land use demanded by changing markets. But the impact of the approach has been limited for two reasons: (1) the reticence of many established researchers to accept the need for demand-driven research and (2) the dearth of researchers trained to work with a farming systems perspective. Finally, the importance of the role of women in smallholder farming systems, though now widely recognized, is still not given sufficient attention in the analysis of farming systems.

Addressing the issues

While Bank interventions helped to expand the capacities of agricultural research agencies, Bank support gave too little attention to the sustainability of the systems at a time of severe fiscal constraints. Local capacity in research planning and priority setting grew slowly, leading to inefficient allocation of resources. These weaknesses form some of the key issues requiring Bank and borrower attention in future lending for agricultural research. Among the recommendations of the OED review:

Promote greater government commitment to agricultural. In both its dialogue with the borrower and in country assistance strategies, the Bank should highlight the importance of publicly funded research in increasing agricultural productivity and reducing poverty. The Bank should also require government commitment to maintaining the research systems before committing substantial resources to a project. Government commitment is not enough, however. Ways must also be found to minimize the fiscal costs of public research. In some Latin American public agencies, particularly those producing technologies for export commodity crops, diversification of funding resources has been successfully tried and adopted.

Box 2: Economic analysis for research planning in Kenya

The experience of the Kenyan Agricultural Research Institute (KARI) in priority setting illustrates the use of economic analysis in national re-search systems. KARI emerged as the key national research institution through the Bank’s National Agricultural Research Project, which has recently begun its second phase. With project support, KARI has the capacity to undertake detailed priority-setting investigations. Some eight commodity research programs, more than half of the 15 national-level crop commodity programs, have been prioritized in a process developed collaboratively with the International Service for National Agricultural Research. The five-step process synthesizes information on client constraints, brings in expert opinion on the potential for generating and adopting technologies, and uses a georeferenced quantitative database on climate, soils, population, production, and price details at the local level. The process compiles the relevant information base, and then identifies target research zones and corresponding research themes. The potential for the generation and adoption of technology is then elicited in detail: for example, the extent of anticipated yield gains, probabilities of success, and the various lags in development and adoption are quantified. The economic analysis assembles all the information in an extensive estimation of research-induced net benefits. The final step is to establish the priorities for research with the program’s various stakeholders. The Kenyan experience illustrates the crucial importance of developing a core of skilled facilitators to coordinate such work and to foster ownership of the findings among stakeholders. Commodity Program Priority Setting: The Experience of the Kenyan Agricultural Research Institute, ISNAR Briefing Paper no 34, May 1997.
Promote cooperation and partnerships and strengthen the links among the national research systems. Individual NARSs form part of a global agricultural research system that has many disparate, partially linked elements. The Bank can further strengthen these links by promoting strategic partnerships among national research systems, international research centers, and other institutions involved in research. The Bank should also promote regional collaboration (similar to SPAAR) based on each national research system’s comparative advantage to help rationalize research and maximize the use of available resources.

Boost efficiency by linking research priorities to available resources and by improving research management—for example, through improved human resource management and incentive systems; adoption of financial and administrative procedures more in tune with the needs of scientific research; and greater involvement of stakeholders in the funding, governance, and implementation of research. The use of economic analysis in determining research priorities can also be helpful.

Strengthen the relevance of research through the use of economic assessment, surveys of technology adoption, and analysis of farming systems featuring the active involvement of stakeholders and beneficiaries in research design and evaluation. In this context, the establishment of performance indicators is essential, not only for monitoring and evaluation, but also for assessing the adoption of developed technology by intended clients.

Bank Management, in its response to the study, agreed with OED that continued support for agricultural research should be a high priority in future Bank operations. Management concurred with OED that the adoption of sound research management principles is a high priority. It noted that in recent years, Bank emphasis has switched from expanding the physical infrastructure and size of research systems to enhancing the efficient use of the physical and human resources already available. It agreed that government commitment to adequate research funding is critical, and that cost-recovery mechanisms need greater attention, as do diversifying funding sources. But it also emphasized that Bank support must be based on country-specific situations and needs.

While agreeing with many of the study’s recommendations, management differed with OED on the importance of ex ante evaluation. Agricultural research, like any scientific endeavor, is an inherently uncertain process, often with unexpected outcomes. While post completion evaluations show that investments in agricultural research provide high payoffs, anticipating those payoffs for designing programs is difficult and costly. Institutionalizing the capacity to identify priority research programs in systems supportable by the Bank will be an important continuation of work begun in the 1990s as will translating priorities into real changes in research resource allocations. Management noted that the Bank’s future agenda in agricultural research will include greater focus on institutional pluralism in research execution by ensuring that universities, the private sector, and NGOs are considered an integral part of the NARS. Pluralism, combined with budget constraints, also means greater rigor in defining the types of research considered public goods (thus appropriate for public funding) and more attention to tapping new and more diverse funding sources. Finally, Bank-supported projects are emphasizing NARS access to global scientific advances by helping to strengthen capacities in some of the basic research sciences, as well as by improving communication and exchange with scientists in international research centers and advanced research institutes.

The Committee on Development Effectiveness in its comments on the study noted that the Bank is the largest single source of external financing to agricultural research in developing countries; it thus has a key role to play—both in enhancing the prospects for sustainability of NARS investments and in ensuring that effective and sustainable arrangements are in place to introduce appropriate technologies to targeted farming communities. The committee stressed that the importance of the agricultural sector and the technological advancement for improved agricultural productivity should be integral elements in the Bank’s dialogue with borrowers. The committee cautioned against providing high levels of funding without first carefully analyzing the government’s fiscal support for agriculture and agricultural research. Borrower commitment to adequately fund research systems and to adopt sound research management principles must be ensured. The committee emphasized the need for more relevant research that addresses the needs of smallholder farmers. The Bank should continue to insist on research being client driven and responsive to defined client needs, and it should take more initiative in promoting the formal involvement of beneficiaries in the design and evaluation of research projects. While acknowledging management’s view that it is difficult to quantify the outputs of research beforehand, it generally agreed with OED’s recommendation of using ex ante economic analysis for strategic planning and prioritizing of research for efficient use of scarce resources. The committee stressed the importance of monitoring and evaluation procedures that provide information not only for financial and program planning, but also for assessing the adoption of developed technology by the intended clientele (and for understanding the reasons for nonadoption). It suggested that such procedures should become a mandatory element of Bank-supported research projects.

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