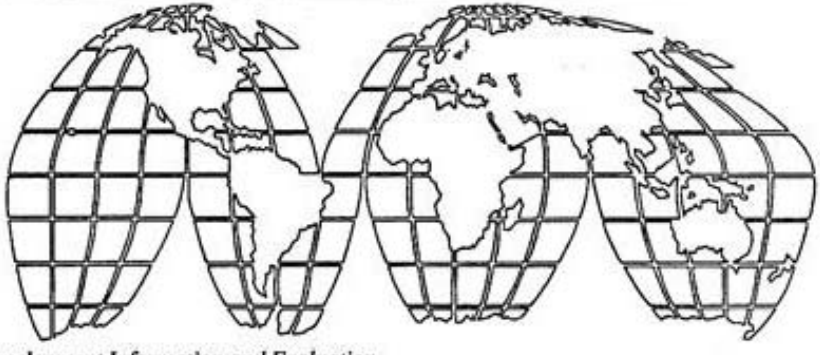
A Review of A.I.D. Experience: Farming Systems Research and Extension Projects—1975–1987



Center for Development Information and Evaluation
U.S. Agency for International Development (A.I.D.), Washington D.C. 20523

SUMMARY

Farming systems research and extension (FSR/E) projects funded by the Agency for International Development (A.I.D.) have had a mixed impact on technology development and transfer and institutionalization of FSR/E. These projects have provided research and extension personnel with opportunities for training and field experience in FSR/E, but FSR/E has yet to be effectively incorporated into technology development and transfer systems to an extent that would permit FSR/E to begin to achieve the impact on agricultural production assumed in project designs.

Key constraints to FSR/E project implementation and impact have included the lack of the following: a problem-solving approach, effective collaboration across disciplines, links of research with extension, consensus on methodology for FSR/E, stakeholder understanding of FSR/E, agricultural policy and strategy defining FSR/E's role in research and extension, staffing of projects with trained manpower, and government funding to meet recurrent costs.

While the FSR/E concept often has not been well understood by project implementors or A.I.D. management, agricultural projects that seek to strengthen technology development and transfer can benefit by using the FSR/E concept more effectively. The lessons learned from this Center for Development Information and Evaluation review can serve to improve design, implementation, and evaluation of agricultural projects having a technology development and transfer component.

BACKGROUND OF THE PROBLEM

FSR/E gained momentum during the 1970s as the perception grew that the conventional approach to agricultural research and extension did not work well in most developing countries. Typically, commodity or discipline research based at experiment stations followed a top-down technology development and transfer model. Scientists proceeded without considering the actual problems that farmers faced. Lacking knowledge and understanding of the management conditions under which small farmers operate, many researchers erroneously assumed that smallholder farming systems are static, that small farmers reject technologies out of sheer ignorance or traditionalism, that small farmers seek to maximize yield and profit, and that commodity-oriented research can generate broad-based technologies relevant to smallholder

farming systems. As a result, "improved" technologies frequently failed to attract farmers to adopt them.

A.I.D.'s ASSISTANCE APPROACH

A.I.D. responded by committing project funds to FSR/E, a new approach to agricultural research. Since 1975, more than 75 A.I.D. agricultural projects have included some form of FSR/E. FSR/E projects use on-farm research and extension to test, adapt, integrate, and disseminate new technologies for adoption by farmers. Technology development is based on a knowledge of the whole farming system, and technology evaluation takes into account technical criteria (such as yield improvement) as well as the farm family's socioeconomic circumstances. Further, knowledge of farming systems is used to help define on-station and on-farm research agendas, with the expectation of generating productivity- and income-increasing technologies more acceptable to smallholder farmers.

Viewing the farm as a system, FSR/E practitioners focus on farm family attributes—goals, preferences, skills, resources (such as labor), production activities, and management practices; interdependencies among system components that family members control; and interactions of these components with physical, biological, and socioeconomic factors not under the farmer's control.

FSR/E's Core Characteristics

FSR/E entails the blending and sequencing of nine *core characteristics*:

FSR/E is farmer oriented. FSR/E targets small-farm families as the client group for research and identifies technology relevant to this group's management conditions. This is done by identifying these conditions before proposing technological solutions and by adapting technologies to local circumstances and needs.

FSR/E involves the client group as participants in the research and extension process. FSR/E practitioners involve and work with client group members to design, implement, and evaluate research and extension activities.

FSR/E recognizes the locational specificity of technical and human factors. FSR/E practitioners identify client groups of farmers that are relatively homogeneous in terms of agroclimatic, socioeconomic, and other factors.

FSR/E is a problem-solving approach. FSR/E practitioners identify the constraints to increased farm productivity and income. Their primary concern is to help farmers solve problems.

FSR/E is systems oriented. FSR/E views the total farm as a system of natural and human components. It evaluates the potential for introducing improved technology in one or more production subsystems, as well as the impact of this technology on the farming system as a whole.

FSR/E is interdisciplinary. Collaboration among agricultural and social scientists facilitates identification of the conditions under which small farmers operate; diagnosis of constraints; and design, conduct, and evaluation of research and extension activities aimed at developing and introducing improved technologies suitable to the client group of farmers.

FSR/E complements, not replaces, conventional commodity and discipline research. FSR/E adapts technologies and management strategies from discipline and commodity research to the farmers' agroclimatic environment and socioeconomic circumstances.

FSR/E tests technologies in on-farm trials. On-farm collaboration between farmers and FSR/E practitioners provides each with a deeper understanding of the farming system and the farmer's decisionmaking criteria and allows for development of technology under farm-level environmental and management conditions.

FSR/E provides feedback for shaping research priorities and agricultural policies. FSR/E, a dynamic and iterative process, provides information on farmer goals, needs, priorities, and criteria for evaluating technologies and on how new technologies perform under farm conditions.

If any of these core characteristics is missing from a technology development and transfer methodology, the methodology is not FSR/E, and its practitioners are not doing FSR/E.

IMPACT

Assessing FSR/E project impact on technology development and transfer is confounded by three factors:

1. The relative contributions of conventional agricultural research and FSR/E are not readily separable—they are complementary.

2. Technology adoption depends on factors not under the control of FSR/E teams, such as physical infrastructure, policy environment, and agricultural support institutions (such as credit).

3. Because FSR/E encompasses technological development and institutional change, significant results may only be achievable in a longer timeframe (such as 15 to 25 years).

Beyond these factors, expectations about how quickly or the extent to which FSR/E could by itself increase the productivity of a country's agriculture may have been unrealistic. For example, FSR/E project "logical frameworks" often assumed goals and objectives for farm-level impacts that could not be achieved within the typical A.I.D. project timeframe. Some project designs erroneously assumed that technologies were available for on-farm testing and adaptation to a variable agroecological environment.

Although evaluations and case studies of 12 A.I.D.-funded FSR/E projects provided insufficient data to assess direct beneficiary impact (e.g., farmer income), they indicated some success in training development personnel in FSR/E and providing them with practical opportunities to gain field experience. Participation in FSR/E not only changed researchers' attitudes about small farmers as the clients of research but also influenced how researchers defined research problems, set research priorities, and carried out problem-oriented research on farms. Such changes have increased the likelihood that research and extension will focus on problems that are relevant to farmers.

Despite these successes, the total time needed to institutionalize FSR/E is probably 15 to 25 years or more. Most FSR/E projects, with a life-of-project funding of 5 years or less, did not have as much of an impact on technology development and transfer or institutionalization of FSR/E as had been assumed in these projects' designs (logical frameworks).

FINDINGS

The gap between actual and expected impact was caused not by any shortcoming in the FSR/E concept per se but rather by the failure of FSR/E projects to address core, operational, and generic constraints to implementing the FSR/E concept.

Core Constraints

During the early years of FSR/E projects, the "farming systems" concept was neither well defined nor widely understood. FSR/E project implementors, trained in conventional disciplines, were not well versed in the FSR/E concept, lacked field experience with it, and were not accustomed to the interdisciplinary approach to solving agricultural problems that were of concern to farmers.

There were few bona fide FSR/E practitioners; within A.I.D., probably even fewer persons understood the core characteristics required for technically sound FSR/E. As a result of confusion and uncertainty about what FSR/E is, should be, or could be, many so-called FSR/E projects were *not* doing FSR/E. Indeed, the most frequent core constraints, appearing in at least 7 of the 12 projects, were lack of a problem-solving orientation and lack of an interdisciplinary approach.

Operational Constraints

FSR/E projects often did not address operational constraints to implementation. At least 7 of the 12 projects suffered from lack of the following: consensus on FSR/E methodology, agricultural research policy or strategy defining FSR/E's role, links of research with extension, and stakeholder understanding of FSR/E.

A major constraint was the lack of consensus among technical assistance, counterpart, and A.I.D. personnel on how to implement FSR/E. Also problematic was conducting FSR/E in settings where agricultural policy and strategy did not define FSR/E's role relative to research and extension and where FSR/E was perceived as competing for scarce resources. FSR/E also was hampered by failures in ensuring that key stakeholders (such as managers of research and extension) understood FSR/E's benefits and requirements, that FSR/E practitioners could analyze and interpret the data collected, and that extension was effectively linked with research as a source of technology.

In short, A.I.D. introduced FSR/E without realizing that FSR/E projects could not make an impact unless they could fulfill a broader set of conditions than those implied by FSR/E's core characteristics alone.

Generic Constraints

A generic constraint is present when FSR/E implementation is impeded by problems that can arise in any A.I.D.-funded project, regardless of the project's technical focus. The two most frequent generic constraints, appearing in at least 7 of the 12 projects, were lack of staffing with trained manpower and lack of government funding to meet recurrent costs.

All too frequently, A.I.D. attempted to implement FSR/E projects where adequately trained manpower to fill counterpart staff positions and funding for recurrent costs (such as fuel for project vehicles) were not or could not be provided.

Other areas in which problems were encountered included project management structure, management of training, and management of technical assistance. Technical assistance problems included delays in the arrival of personnel, turnover of personnel, lack of experience in FSR/E, and allocation of technical assistance time to project administration rather than to FSR/E.

Most Frequent Constraints Found in 12 FSR/E Projects

Core

Problem-solving approach (9 projects)
Interdisciplinary approach (7)

Operational

Links with extension (9)
Consensus on FSR/E methodology (8)
Stakeholder understanding of FSR/E (7)
Research policy/strategy defining FSR/E's role (7)

Generic

Staffing with trained manpower (10)
Government funding to meet recurrent costs (9)
Management of technical assistance (7)

LESSONS LEARNED

This review of A.I.D.-funded FSR/E projects suggests the following as key lessons learned (many of which are reinforced by similar conclusions emerging from a recent A.I.D./Bureau for Science and Technology/Office of Agriculture-funded "results inventory" of FSR/E projects).

The Farmer in FSR/E

In FSR/E, the farmer plays a central role in technology development and transfer—one of an active collaborator, not just a passive observer or receiver. Yet FSR/E practitioners often have had difficulty implementing this concept because highly centralized and vertically structured research and extension systems are geared to respond to top-down lines of authority rather than to farmer-identified needs and priorities.

Farming in FSR/E

FSR/E projects have tended to focus on the food crops raised by subsistence farmers, paying little attention to the other commodities that these farmers produce for sale. Several evaluations raised the issue of whether FSR/E should place greater emphasis on cash crop technologies to help farmers produce and market higher valued crops or animals.

Systems in FSR/E

FSR/E practitioners often have not gone beyond "lip service" to the concept of the farm family household as a system of natural and human components that must be understood if FSR/E is to influence agricultural income. Some FSR/E practitioners spent so much time studying the farm as a "system" that they never got around to testing potential technologies or institutional changes to overcome constraints. Others focused on a single crop (for example, maize) but failed to examine the crop's interrelationships with other system components (such as livestock).

Research mandates have caused FSR/E practitioners to focus on improving production technology (primarily for crops) as *the* end rather than *a* means. Not building increased farm family income into the design of FSR/E increases the chances that FSR/E will not focus on the farm and farm family as a system, thereby losing the systems concept as FSR/E's guiding rationale.

Research in FSR/E

Because FSR/E emphasizes research aimed at developing technologies to relax production constraints, FSR/E practitioners often have failed to address institutional constraints to adoption of the technologies being developed. Farmers frequently cannot adopt such technologies unless they also have access to such agricultural support services as credit, production inputs, and markets. FSR/E practitioners, particularly social scientists, need to place greater research attention on identifying means to remove or relax institutional constraints that impede farmers' access to agricultural support services.

Extension in FSR/E

Each FSR/E project reviewed was located in a research organization, thereby raising the problem of how farming systems research would be linked with extension. Many FSR/E projects viewed the "farming systems approach" as a research strategy, not as a strategy to integrate research and extension.

The Research/Extension Link in FSR/E

Although improved agricultural technologies are rarely transferable directly from research to extension, FSR/E teams can play an important role in linking research and extension by working with farmers and extension to test and adapt technologies derived from research and with researchers to provide feedback to establish research priorities. However, without an adequate incentive structure, it will be difficult to link research and extension into a productive partnership.

Methodology of FSR/E

A.I.D.-funded FSR/E projects have provided an opportunity for field-level development, testing, and adaptation of FSR/E methodologies. However, FSR/E's impact on technology development and transfer will be negligible until research and extension personnel work out a joint strategy to institutionalize FSR/E methodology in research and extension programs.

Current Status of FSR/E in A.I.D.

Many of FSR/E's core characteristics (such as on-farm trials) are now designed almost routinely into A.I.D.-funded agricultural projects. Further, an A.I.D.-sponsored survey of A.I.D. missions found that the missions place a high priority on training in FSR/E, institutionalization

of FSR/E, and technology transfer. These trends indicate that FSR/E is playing a role in Agency-funded projects aimed at strengthening agricultural research and extension.

There Are No Panaceas

As A.I.D. turns its attention to "new" problems (such as sustainability of natural resources), the Agency should refrain from assuming there are "magic bullets" that will quickly lead to smallholder development in the developing countries. Achieving smallholder development objectives will be served best by systematically addressing the problems of agricultural research and extension on a sustained, long-term basis.

OUTSTANDING ISSUES

Three outstanding issues merit consideration: (1) sustainability of FSR/E, (2) sustainability of natural resources, and (3) project orientation to FSR/E.

Sustainability of FSR/E

The FSR/E concept cannot be institutionalized unless recurrent costs can be met. This is impeded by government research and extension budgets that leave few resources for carrying out on-farm activities (such as on-farm trials). External support for FSR/E must provide incentives for public and private funding of research and extension, and must ensure that host-country research and extension organizations develop a capability to assume FSR/E's recurrent costs.

Sustainability of Natural Resources

Those concerned with "new" issues (such as sustainability) may fail to see the role that FSR/E can play in natural resources, agroforestry, and agricultural projects. If properly implemented, FSR/E could offer an excellent vehicle for addressing the sustainability of the natural resource base. The challenge is to ensure that sustainability initiatives involving FSR/E's core characteristics are not undermined by the same constraints (core, operational, and generic) that plagued past FSR/E projects. Those developing a "sustainable agriculture" agenda should ensure that the constraints impeding past FSR/E projects do not come back to haunt new projects aimed at supporting a transition to sustainable agriculture.

Project Orientation to FSR/E

FSR/E would not be where it is today in many countries without the support that A.I.D. and other donors provided FSR/E projects. However, implementation of FSR/E has not been facilitated by an assistance mode (the project) that provides support for only a 3- to 5-year span; indeed, the limited impact of FSR/E projects reviewed was to a certain extent predetermined by these projects' short lifespan. Success in research and institutional development requires a longer timeframe, and this is no less true in FSR/E.

FSR/E is not a substitute for conventional research but can be instrumental in accelerating the speed with which technologies are developed and transferred. But this process is not aided by a short-term orientation to agricultural research in general or FSR/E in particular. Support needs to be sustained over the long term (15 to 25 years).

The challenge for future A.I.D.-funded agricultural projects is to address the constraints to FSR/E more effectively. A.I.D. can strengthen the contribution of agricultural research and extension to technology development and transfer by ensuring the following:

- That FSR/E's nine *core characteristics* are systematically built into technology development and transfer methodologies;
- That agricultural research and extension projects provide a means to remove or relax the *operational constraints* that can impede implementation of FSR/E; and
- That *project assistance* to relax core and operational constraints to FSR/E is not undermined by *generic constraints*.

The problems encountered in implementing the FSR/E concept in FSR/E projects did not result from any shortcomings in the FSR/E concept but rather from limited knowledge and understanding of the requirements for implementing this concept. FSR/E, when properly implemented, can strengthen the technology development and transfer capability of agricultural research and extension systems.

The challenge is to integrate FSR/E into technology development and transfer methods and not permit it to be undermined by the same core, operational, and generic constraints that have impeded FSR/E's implementation and institutionalization in developing country research and extension systems. FSR/E explicitly recognizes the need for links among farmers, extension workers, and researchers, and defines the essential conditions (FSR/E's core characteristics) for increasing the impact of donor, government, and private investment in agricultural research and extension.

However, such impact cannot be fully realized unless development assistance also addresses the various operational constraints that can impede institutionalization of FSR/E. This will require a long-term commitment to institutionalize technology development and transfer systems responsive to the problems faced by smallholder farmers in the developing countries. If A.I.D. has the vision and the means, the Agency's continued support for institutionalizing FSR/E can play a crucial role in increasing the productivity and income-earning capability of small farmer agriculture throughout the developing countries.

This "Highlights" is based on a review of evaluations and case studies of 12 farming systems research and extension (FSR/E) projects funded by the Agency for International Development between 1975 and 1987, as follows:

Botswana Agricultural Technology Improvement (633-0221)
Gambia Mixed Farming and Resources Management (635-0203)
Lesotho Farming Systems Research (632-0065)
Malawi Agricultural Research (612-0202)
Senegal Agricultural Research and Planning (685-0223)
Tanzania Farming Systems Research (621-0156)
Zambia Agricultural Research and Extension (611-0201)
Nepal Agricultural Research and Production (367-0149)
Philippines Farming Systems Development (492-0356)
Guatemala Food Productivity & Nutrition Improvement (520-0232)
Honduras Agricultural Research (522-0139)
ROCAP Small Farm Production Systems (596-0083)

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