CGIAR

Factors Affecting the Adoption and Impact of CGIAR Innovations

A Project Overview

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BACKGROUND

This paper constitutes an initial report on the formation of and methodology to be used in a large-scale, multi-faceted project that is aimed at determining whether international agricultural development research is having its intended effects on the countries and peoples on whose behalf it is being funded and carried out. The project is being carried out under the auspices of the Impact Assessment and Evaluation Group (IAEG) of the CGIAR. The study reported on here involves a set of ten integrated case studies aimed at determining the factors that are critical in the process that leads to successful adoption into the food production system, e.g., by seed growers, by manufacturers, or by farmers, of an agricultural innovation thought by its developers to be effective and ready for dissemination. The study is derived from the self-evident conclusion that innovations not adopted cannot be effective in any way.

The ultimate purposes of international agricultural development research are "to produce new agricultural and policy advances to alleviate poverty and hunger in developing countries in ways that protect and enhance the environment." (CGIAR, 1994, p. 7). Put somewhat more simply, the outcomes desired are increased food security, decreased poverty, and a protected environment. After several decades of research, questions are being raised about the extent to which those aims are actually being achieved, and sponsors of the research are eager for evidence that their efforts are well placed. It is possible that for many reasons stemming from the complexity of the world economy, coupled with profound problems in many local cultures and economies, international agricultural research is not being effective in achieving its aims and that it might even, in some circumstances, make things worse.

The CGIAR and IAEG

Both in response to the foregoing questions, but also as a matter of wishing to establish and maintain its own accountability, in 1995, the Consultative Group for International Agricultural Research (CGIAR) established the IAEG for the purpose of carrying out investigations into the effectiveness of international agricultural research. The IAEG is charged specifically to carry out ex post investigations into the impact of agricultural research conducted by the international Centers. The IAEG has developed a comprehensive plan for assessing the current state and effectiveness of the international research program, and the project reported on here is a part of that overall plan. In addition to investigations into the factors associated with success in promoting adoption of agricultural innovations that are outlined in this paper, the IAEG has commissioned projects to assess the impact of CGIAR germplasm improvement, and to assess the impact of CGIAR innovations on poverty levels in developing nations. It is also reviewing ex post impact studies undertaken by Centers during the past 15 years.

The CGIAR, founded in 1971, is "an informal association of fifty-two public and

private sector members from the South and North, whose mission is to contribute through research to sustainable agriculture for food security in developing countries. FAO, UNDP, UNEP, and the World Bank are the CGIAR's four cosponsors." (CGIAR, 1996, p 7) At the time CGIAR was founded, four international research centers were in operation: the International Rice Research Institute (IRRI) in the Philippines, the Centro Internacional de Majoramiento de Maiz y Trigo (CIMMYT) in Mexico, the International Institute of Tropical Agriculture (IITA) in Nigeria, and the Centro Internacional de Agricultura Tropical (CIAT) in Colombia. Since that time 14 additional Institutes or Centers have been established around the world. CGIAR receives its financial support from its members and is accountable to them. It is safe to say that in the international agricultural research community, CGIAR is the only group with a comprehensive and global outlook on problems and prospects in relation to agricultural innovation and development, particularly in relation to food, poverty and the environment.

Understanding dissemination

The term "effective dissemination" may be used to imply a dissemination effort for an innovation that not only produces a high level of awareness of the innovation but that maximizes the likelihood that it will be adopted (Sechrest, Backer, and Rogers, 1994). Innovations may not be completely adopted for good reasons, but if a dissemination effort has been successful, the only nonadopters should be those persons or groups with good reasons not to become one. It is evident that effective dissemination is a requisite for the success of any agricultural development effort based on innovative technologies. Agricultural research centers may develop technologies that are potentially highly effective, but if they are not adopted by farmers or other appropriate agents, then the efforts of the centers will have been largely, if not completely, wasted. Therefore, as part of the overall IAEG effort to evaluate agricultural development research efforts, the determination of factors associated with effective dissemination was of obvious importance. This paper reports on the development of a project, now well underway, to uncover those factors

The term "farmer," of course, cannot be taken as referring to a homogeneous set of persons engaged in agricultural production. Farmers differ both within and across geographical regions in the crops they tend or the kind of product with which they are involved, in their entrepreneurial spirit, in the social and familial circumstances, and in their economic resources and prospects. We do not imagine that the tangled skein of relationships among all these variables and their relationship to adoption of innovations can be sorted out in the relatively modest efforts in which we are involved. We can hope only to make progress in understanding of all these factors and in plotting the course of future research that might reduce uncertainty by growing degrees.

The "gold standard" in methodology for evaluating virtually any intervention is the randomized experiment, and if one wanted to know whether, let us say, providing farmers with the seed for a test-plot of a new cultivar would increase adoption, an experiment would probably provide the most definitive evidence (Boruch, 1997). Randomized experiments, however, are very often difficult to mount, slow to develop, and uncertain in their impact. The latter is exacerbated by the fact that experiments very often require a simplification of context for the intervention or a simplification of the intervention itself that is inimical to the ultimate acceptance of their results.

Moreover, experiments are usually not especially useful in discovering causes, i.e., in exploring a problem in order to determine factors that might be important causal elements. Experiments require that causal factors be identifiable *a priori* so that they can be manipulated and their effects tested. Although we do not view the CGIAR project reported on here to be exploratory in any naïve way, it addresses, nonetheless, a set of questions for which prior answers would not be readily formulatable for experimental testing. It is also true that the fact that the study needs to be done, for reasons to be explained shortly, in multiple sites and for a wide range of innovations, makes even contemplation of interventional experiments impossible.

THE CASE STUDY STRATEGY

In recent years, case study methodology has been formulated in more exact terms and with greater precision of recommendations for its use under different circumstances. Case study methods, although not well suited to impact assessments, are of great potential value in elucidating causal factors and the ways in which they work. The Program Evaluation and Methodology Division of the United States General Accounting Office, in particular, contributed greatly to a more useful formulation of case study method (Program Evaluation and Methodology Division, 1987). The GAO report was especially important for suggesting that case study methodology might actually be useful in studying "program effect," i.e., in relation to causal inferences about the results of interventions. Robert Yin (1989) had also provided a helpful framework for the conduct of case studies. It remained, however, for Sechrest, Stewart, Stickle, and Sidani (1996) to propose explicitly the rationale for use of case studies in causal inference and to formulate principles and guidelines related to that use.

The work of Sechrest, et al. (1996) is the basis for the overall case study project described here and for the individual case study projects that comprise it. Concepts for the case studies were developed with the explicit idea that the results might be deemed to have "probative" value for propositions about the relationship between certain characteristics of innovations and their introduction and the likelihood of their adoption. A critical idea underlying the proposed case study methodology is that the case studies should be deliberately planned, in detail, and conducted in a systematic way according to a protocol. As with other forms of scientific methodology, it is important that case studies be fully rationalized and documented. One of certainly the two most often voiced objections to case studies is that they are "subjective." By developing and following a specific protocol, at least many, if not all, objections to the subjectivity of case studies may be mitigated.

The second frequent objection to case studies is that their findings are not generalizable, an objection based on the obvious fact that a case study involves at most a very small sample, if, indeed, more than one, of whatever it is a "case of." The objection, however, is very often overstated and facile. All scientific research articles rest on a small sample of something: small number of cases, narrow representation of interventions, small number of sites, and so on. One almost never hears objections to some such conclusion as that "increased crop yield will result from higher amounts of fertilizer," even though the study in question may have compared only two levels of a single formulation of one type of fertilizer. Moreover, such studies are almost always carried out in one or a very few plots in a single geographic area. Cook (1993) has presented a detailed explication of the idea that the ultimate aim of most of our research is to generalize about causal effects but that the dimensions across which generalizations must be made are numerous.

The objection that case study conclusions are not generalizable to other samples depends on the assumption of heterogeneity in the sampling units. In fact, however, we know that populations are often quite homogeneous on many characteristics. For example, if we water a plant with brackish water and it shrivels up and dies, we do not

need to test the reaction on a great many plants of the kind involved. Nor on closely related plants. Plants are substantially homogeneous within varieties in their physiologies. It is usually assumed that farmers around the world are similarly fairly homogeneous in the ways in which they go about making decisions and in the factors that influence those decisions, although, of course, the specific values for different factors may vary. It is likely that in considering the adoption of an innovation, all farmers consider the risk entailed and all farmers are likely to be appreciative of an opportunity for gradual, rather than abrupt, adoption—that is, if farmers anywhere are sensitive to such considerations. Farmers may differ both within and between sites in their level of risk aversion, but we expect that risk will be taken into account everywhere if anywhere.

As Cook (1993) makes clear, it is the causal principles that are at issue with respect to generalization of findings. Yin (1989) also states that it is theory that is to be generalized, not necessarily specific findings. The design of the present overall project incorporates a number of case studies, several of which are "multiplist" individually, i.e., they involve more than one site, more than one specific innovation, more than one type of data. We are, as will be shown later, seeking to develop some basic principles about effective procedures for enhancing adoption of innovations, and the data available will represent multiple sites, multiple innovations, and multiple investigators. What will be common to all, to as great an extent as possible, is a protocol to guide the development of the individual case studies.

Synthesis across case studies

The design of the overall study being described here includes specific provision for synthesis of findings across case studies. Of course, some synthesis will be required within some of the studies, those that represent multiple sites or innovations. The plan for synthesis over all the case studies begins with specification of "synthesis issues," which are issues related to adoption that appear likely to cut across several, or perhaps all, of the individual studies. All the individual investigators know these issues so that they can incorporate plans for collection of relevant data into their own studies.

Obviously, we would all like to know whether agricultural innovations proposed for use in developing nations have desirable outcomes, i.e., in terms of effects on food security, poverty, and the environment. Case study methodology is not ideal for that purpose, and the present study does not bear much on such issues. Nonetheless, we believe that useful ideas may come from some of the case studies in which it will be possible to query farmers, or other potential end users of innovations, about their lives and prospects for the future. The advantage of case studies is often framed in terms of "thick description" (Sechrest et al., 1996), and the case studies being carried out in relation to agricultural innovations may permit relatively thick description of at least some aspects of their origins in the research institutes and centers, the circumstances of their introduction into the contexts of agricultural production, and their effects on the lives of farmers and their families.

METHODOLOGY

The toolkit for Effective and Persuasive Case Studies (Sechrest, et al., 1996) assumes that case study methodology can be made considerably more explicit and rigorous than is usually the case. It also assumes that a key to enhancing the rigor of case studies is the development of specific protocols to guide their implementation. The toolkit includes a suggested template to be followed in developing and carrying out case studies to increase the likelihood that decisions will be made with forethought, that appropriate documentation of case study methodology will be assembled, and that all required data will be collected in a systematic and interpretable way. The foregoing provisions are probably especially important when a case study is intended in some way to be probative, to support a causal inference, e.g., rather than simply being done for illustrative purposes.

Probative case studies

It is readily apparent that very few case studies are likely to be taken as proof of anything, although Sechrest et al. (1996) present a number of instances in which case studies have been taken quite seriously as indicators of causal relationships. The assumptions underlying the use of case studies in the present context are that if the case studies are based on a sound theory of the relationships between supposed independent variables and the dependent variable of adoption, if they follow a strategy aimed at persuasive argument, are carefully planned and executed, and if they are presented effectively, they are likely to be accepted as bearing in important ways on the answers to questions addressed.

We also note that very few propositions of any substantial interest are ever accepted on the basis of any one study, no matter how well designed and carried out. The results of even very well conducted experiments are likely to be incorporated into the knowledge base only if they are theoretically plausible, fit with data from other sources, and so on. Perhaps it is exaggerating to think that case studies might be probatory (taken as proof); "confirmatory" might be a better term. In any case, we believe, on the basis of both careful reasoning and extensive reviews of prior literature that the case study is a valuable addition to the methodological armamentarium of social scientists and that case studies can produce information whose utility fully justifies the effort to carry them out.

Case study training workshop

In order to develop a shared understanding of the overall aims of the study and how they would be reflected in specific case studies, it seemed necessary to identify all the potential participants in the study, solicit their ideas and expressions of interest, select those most appropriate, and then bring them all together. Potential participants were identified by notifying all the international agricultural research institutes and centers of the plans for doing the case studies and encouraging them to submit proposals. As originally planned, it appeared that perhaps five case studies might be supported from the financial resources available. Ultimately, five proposals were "accepted" for the core of the project, and four more were added at their own request, with the thought that they might participate "on their own," i.e., without any outside financial support or

consultation. As the project has evolved, however, the nine individual case studies are indistinguishable except for outside financial support. Still another single case study, albeit of a somewhat different nature, was added to the project in recent weeks.

A workshop on the case study methodology was chosen as the focal activity around which planning for the case study project could be carried out. Accordingly, representatives from all nine case study sites were invited to attend a three-day workshop in Rome in Feb. 1997. Most case study sites sent a representative from the Center and from a NARS partner organization, and the total attendance at the workshop included 14 investigators from case study sites, IAEG representatives, and several other persons from FAO who were present for varying amounts of time.. Prior to the workshop, all case study sites were sent copies of the case study toolkit, i.e., Effective and Persuasive Case Studies, along with several pertinent articles. All case study sites had, in turn, submitted at least brief proposals for their projects.

The format of the workshop was a combination of didactic presentation of background concepts and interactive discussions of specific problems and applications. The structure of the workshop is given as an appendix to this paper. In general, the workshop covered the rationale for the overall concern of CGIAR with the outcomes and impact of agricultural innovations and the rationale for case studies of adoption processes and then went on to the specifics of the case study methodology being proposed and the plans for synthesis and dissemination of the ultimate findings.

Substantial emphasis was put on the bases in case study procedures and data for the support of causal inferences. That emphasis included specific discussion of the need for a "theory of the case" and a logic model for how each factor in the process intended to lead to adoption should (or could) have had its effects. The emphasis on theory led quite naturally and directly into consideration of the specific types of data to be collected for each of the case studies and the likely sources of such data in each of the sites. Data requirements, methods of data collection, training of data collectors, and related issues were presented and discussed at some length with the workshop participants. Following that, methods for monitoring the conduct of the case studies and for quality control over all aspects of the studies were covered in some detail. It should be noted that the general approach taken in these phases of the workshop was to ensure understanding of the toolkit and to obtain agreement that its prescriptions would guide the development of the individual case studies.

Analysis of data from case studies was, by contrast, not discussed in much detail since the individual case studies seemed to have been selected and conceptualized in such a way that methods of analysis would be diverse but probably straightforward in nearly all instances. No case studies involving voluminous, unstructured interviews were planned; all of them were, in fact, fairly well focused. Similarly, although the toolkit has a fairly extensive discussion of methods for interpretation of data, not a great deal of workshop time was spent on that topic. Nonetheless, the groundwork was laid for enhancing both the analysis and interpretation of the case studies by planning for multiple investigators at each site and for exchange of experiences and ideas across sites.

Because the final aim of the project was to produce a set of conclusions that would be

generalizable across sites, specific innovations, and even specific local conditions, discussion during the workshop of the synthesis of the case studies was extensive. The idea of a synthesis across the case studies is based on the supposition that, although the individual case studies are unique, there are, even so, issues that recur in or cut across from several to all of them. No effort was made to arrive at a final list of synthesis issues either before or during the workshop because, until a reasonably definitive plan was developed for each case study, it did not seem useful to try to foreclose on any specific set of issues. The ultimate list of questions whose answers are to be synthesized across sites will probably not become final until the synthesis itself is final. A preliminary list has been developed, however, and is appended to this report. An expansion of the list is already a prospect, however, as comments from the individual projects have begun to arrive.

A central feature of the work being undertaken is that it has been planned in such a way as to facilitate syntheses of conclusions across the sites and case studies. All the case studies address, at a general level, a common question. That question can be answered in somewhat different ways and in different terms from one case study to another. Nested within that general question, however, is a subset of questions that each of the case studies has been asked to try to deal with. The more specific questions will not all be addressable within each of the case studies, but we anticipate that each of the questions will be responded to by several of the case studies. That multiplicity of answers should provide some basis for conclusions about the substantive issues represented by the questions but also about the potential generalizability of the findings.

A second feature of the case studies that is critical to their synthesis is that they are all following the same general protocol for the conduct of case studies. The protocol is not rigid, which would probably not be appropriate for case studies, but it provides guidance for each step of the study. Synthesis of the case studies should be facilitated considerably if methodology is similar across case studies and, where it is not, if the differences are explicit and explained. Thus, for example, the specific methods for choosing the case studies have differed across the sites, with some of the cases having been specified reasonably well even prior to the beginning of the overall project. The factors going into the selection process will, however, be documented and described according to a reasonably standard protocol. That should enable those factors to be accounted for in the synthesis. On the other hand, none of the case studies had settled on the data to be collected and methods for collecting them prior to the initiation of the overall project. The decisions about data collection will not only be documented, but they will have incorporated features that should make comparisons across some specific studies reasonable.

The plan for the overall project extends over several stages, beginning with planning for the workshop and ending in the preparation of the synthesis report. Subsequent to the workshop, the case study investigators returned to their stations and prepared plans for the conduct of their studies. It is those plans, still in some degree of development, that are summarized in this paper. During the planning stage, the investigators were provided with additional articles and books, including what is considered the standard treatise on the conduct of social science research in field settings (viz., Cook and Campbell, 1979).

Three of the authors of the toolkit, Sechrest, Stewart, and Stickle, have been commissioned as an overall research team to provide guidance to the individual case study projects and to develop and implement plans for the ultimate synthesis. Known as "the Arizona team," these three researchers provide consultation to the individual case study sites as well as supplementary written materials that might be useful. The case study sites are all linked by a listserve operated by the Arizona team. It is also planned that at least some of the individual case study sites will be visited by the Arizona team about midway through their studies in order to monitor progress, to provide guidance, and to benefit from the experience of the local investigators concerning issues pertinent to the ultimate synthesis.

The final synthesis is to be carried out in two steps. First, the reports from the individual case studies will be assembled by the Arizona team and will be examined and summarized with respect to syntheses of the findings. A draft synthesis report will be prepared and sent to the case study investigators. Then in the penultimate stage of the overall project, all the case study investigators will be brought together for a conference to discuss the synthesis, to add individual perspectives, and to resolve any disagreements or other problems. The final stage of the project will be the preparation of a final report immediately following the synthesis.

DESCRIPTION OF PROJECTS

The individual case studies are diverse and, we think, of great interest in their individual rights. Combined, they should provide a rich data set from which to extract the general principles about dissemination of innovations that are wanted.

Study 1
CIMMYT – Hybrid Maize in Ghana
The International Maize and Wheat Improvement Center (CIMMYT) is studying factors affecting adoption and diffusion of improved maize germplasm in Ghana. The study is being carried out by CIMMYT staff working in collaboration with researchers from the UK-based Overseas Development Institute (ODI) and the Ghana Crops Research Institute (CRI). Although the general objective of the study is to examine the factors that have influenced the adoption of improved maize germplasm in Ghana, specific objectives include: documenting the diffusion of improved maize germplasm by means of a national survey of maize producers; analysis of micro-level factors influencing the uptake and management of improved germplasm (i.e., household resources, farmer knowledge, performance of the technology in farmers' fields); and analysis of macro-level factors influencing the adoption and diffusion of improved germplasm (i.e., price policies, inputs supply systems, rural infrastructure).

Ghana has a long history of CIMMYT involvement through the CIDA-funded Ghana Grains Improvement Project. Additionally, adoption of improved maize germplasm in Ghana appears to have accelerated in recent years, suggesting that important lessons can be learned from the Ghanaian experience. Moreover, the data from the case study will be placed in a broader context both by earlier CIMMYT and CRI adoption studies, which provide baseline data, and by research on farmers' seed management practices currently being planned by ODI and the Overseas Development Agency (ODA).
Key Personnel
CIMMYT – Michael Morris
ODI – Robert Tripp
NARS – Ghanaian collaborator TBD

Study 2
CIAT - Cassava processing in Brazil
Centro Internacional de Agricultura Tropical (CIAT) is studying factors that determine the effectiveness of farmer groups in enhancing adoption of cassava processing and production technologies in Northeast (NE) Brazil. Thus, the particular aims of this study are to assess the factors influencing success of farmer groups, and to better understand the role of these groups in the adoption of both processing and production technologies. Finally, the study examines impact of the adoption of production and processing technologies.

New post-harvest and production technologies have been introduced through the formation of farmer groups among small-scale cassava producers in NE Brazil. In the late 1980's technologies for producing dry cassava chips and organization of farmer / processing associations led to the establishment of some 150 cassava processing plants.

This study will assess the degree to which this level of adoption has been maintained or changed. Moreover, in the early 1990s, techniques of farmer participatory research have been introduced, leading to the formation of approximately 30 farmer research committees, leading to many questions addressed in this study.
Key Personnel
CIAT – Bernardo Ospina Patino, Douglas Pachico, Luiz Alfredo Hernandez, Teresa Grazia
EMBRAPA – Carlos Estavao Leite Cardoso, Jose Humberto Cerqueira, Aristoteles Pires do Matos, Marcio C. M. Porto
SEC AGRIC CEARA (Cassava Committee) – Antonio Raimundo, Genario Marcolino de Queiroz, Walter Parente
EBDA – Empresa Baina de Desenvolvinento
EPACE – Empresa de Pesquisa Agropecuaria do Ceara
EMERA – Empresa de Perquisa Agropecuaria da Paraiba
IPA – Empresa de Agropecuaria de Pernambuco

Study 3
IRRI - Post-production Innovations in the Philippines and Vietnam
The International Rice Research Institute, NARS, and NGOs are studying post-production public sector research, development and transfer (RDT) process by comparing and contrasting life histories of four types of technology in the post-production chain: harvesting, threshing, drying, and milling. The study's premise is that before sustainable adoption takes place, new agro-mechanical technology must be adapted to local conditions, and/or local conditions must adapt to the technology. Thus a primary aim of this study is to better understand how adoption of post-production technologies takes place. The study focuses on two countries with markedly different cultures and labor wage rates—the Philippines and Vietnam.

Both technologies in both countries will be treated as individual program effect (GAO, 1987) or probative (Sechrest et al., 1996) case studies. The generalizability of the findings will be validated by pattern matching (GAO, 1987) with similarly constructed life histories of the other post-production technologies. The main case study technologies, together with the complementary case studies, represent a comprehensive list of post-production innovations that cost less than $ 5,000 that are still in the implementation phase (Rogers, 1983). Five thousand dollars roughly marks the boundary between equipment that is locally manufactured, and imported drying and rice milling equipment manufactured by large companies. The Kubota mechanical reaper, manufactured by Kobota Ltd. in Japan is the one exception. The axial-flow thresher is an exception for another reason. It has passed through the implementation phase and has been sustainably adopted in both the Philippines and Vietnam. The thresher is included because it is the most widely adopted post-production technology in the last 25 years and shows the potential impact that can be achieved when public sector R&D works together with the local manufacturing industry. The axial-flow thresher case study is balanced by the CAAMS-IRRI mechanical reaper that enjoyed initial adoption but was later categorically rejected by farmers in the Philippines and Vietnam.

The life histories for each technology will begin at the decision to develop. The study will focus on the reinventions or adaptations that occurred after the first release to

NARS or manufacturers up until adoption. The study will ask a series of questions about participants, resources, activities, and so on. Answering these questions will test the study hypotheses, which are:

- Successful RDT of agro-mechanical technology occurs in an iterative and evolutionary manner with a high degree of participation of the shareholders in the process.
- In contrast public sector agricultural engineering RDT is planned linearly, assuming the Transfer-of-Technology paradigm (Chambers and Jiggens, 1986).
- The discrepancy between the way the RDT process is planned and the way it happens in practice is a constraint to adoption and impact of public-sector-generated innovations.
- Public sector R&D can have greater impact by recognizing and working with participant strengths and weaknesses in reinvention.

Key Personnel
IRRI – Boru Douthwaite
PhilRice – Sergio Francisco
IRRI-GTZ – Martin Gummert
UAF - Phan Hieu Hien

Study 4
ICRISAT - Comparative study of factors critical to the adoption of ICRISAT/NARS groundnut innovations in Vietnam, India, Malawi

ICRISAT is doing a comparative study of factors determining and facilitating adoption as well as those constraining adoption of improved groundnut cultivars (and production technology practices) in Vietnam, India, and Malawi. Similarities and differences in these factors across the three countries will be identified via focus group meetings (with farmers, NARS and NGO research and extension groups) and on-farm level surveys in these groundnut-growing countries.

The primary aims of the study are to document and understand the process of the research, technology generation and diffusion of ICRISAT/NARS groundnut germplasm innovations and adaptation of production technology options. Specifically the study will generate information on the uptake of improved groundnut cultivars and adaptation of appropriate production technology including rate and extent of adoption, reasons for adoption and non-adoption, and factors critical to adoption of improved groundnut varieties and adaptation of recommended technology options. These aims are being achieved through comparative analysis of the adoption process and critical factors aiding and constraining adoption in Vietnam, India, and Malawi. The comparative analysis is intended to establish causal inferences about adoption of improved groundnut technologies and to draw generalizable conclusions regarding factors critical to adoption. These generalizable conclusions will then be used to formulate strategies and recommendations in order to improve or accelerate the adoption of ICRISAT/NARS innovations on groundnut, as well as to integrate research evaluation efforts of ICRISAT with NARS.

Key Personnel
ICRISAT – Cynthia Bantilan
ICRISAT Asia – S.N. Nigam, C.L.L Gowda
ICRISAT SEA – D. Boughton
NARS:

Vietnam – Phan Lieu
India and Malawi - TBD
NGOs India - Dr. Amin/NAADEM

Study 5
ICRISAT - Comparative study on factors critical to the adoption of ICRISAT/NARS Sorghum germplasm innovations
The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is studying factors determining and facilitating adoption as well as those constraining adoption of sorghum improved cultivars in India and Nigeria (China may be added to this comparison). Similarities and differences in these factors across the three countries will be identified via focus group meetings (with farmers, NARS and NGO research and extension groups) and on-farm level surveys in these sorghum-growing countries.

The primary aims of the study are to document and understand the process of the research, technology generation and diffusion of ICRISAT/NARS sorghum germplasm innovations. Specifically, the study will generate information on the uptake of improved sorghum cultivars and adaptation of appropriate production technology including rate and extent of adoption, reasons for adoption and non-adoption, and factors influencing adoption of improved sorghum cultivars. These aims are being achieved through comparative analysis of the adoption process, critical factors to adoption and constraints in these sorghum-growing areas. The comparative analysis is intended to establish causal inferences about adoption of improved groundnut technologies and to draw generalizable conclusions regarding factors critical to adoption. These generalizable conclusions will then be used to formulate strategies and recommendations in order to improve or accelerate the adoption of ICRISAT/NARS innovations on sorghum, as well as to integrate research evaluation efforts of ICRISAT with NARS. Moreover, the information gained will provide feedback for research priority setting to both IARC and NARS and help to integrate research evaluation efforts of ICRISAT with NARS.
Key Personnel
ICRISAT – Cynthia Bantilan
ICRISAT Asia – B.V.S. Reddy, C.L.L Gowda
ICRISAT WCA – R. Tabo
NARS Samaru, Nigeria, India - TBD
Seed Sector India - JK Seeds, ProAgro Seeds, Mahyco

Study 6
ILRI – Small-Holder Dairy Technology in Kenya
The International Livestock Research Institute is studying factors affecting adoption of technologies leading to intensification of smallholder dairy production in Kalifi District, Coastal Province, Kenya.

The coast of Kenya is one of the three poorest regions in the country. Soils are highly weathered and leached, and most farmers have relied on the traditional tree crops (cashews, coconuts) to generate cash with which to buy food. Very few farmers grow enough subsistence crops with which to feed the family for more than a few months of the year. The two major constraints to the development of small-holder dairy systems

on the coast have been: (1) the risk of East Coast Fever (ECF) and other diseases have had a large inhibitory effect on adoption of technology and intensification, and (2) lack of secure market outlets, with most sales coming informally over the farm gate. In such a situation, it is clear that the solutions have to be found within a systems context, and moreover that solutions have to be applied simultaneously if real change is to occur.

From 1989 to early 1994, KARI, ILRI and collaborators undertook a several activities to improve systemic operation. Impacts were seen at the farm level and it appears that even more change occurred at the institutional level, with effects continuing to the present. These activities indicated that smallholder dairy farmers could benefit from improved breeding strategies, better health practices in relation to their herds, integrated feeding systems capitalizing on foraging resources, and a more informative marketing environment. The studies had a large impact on research credibility with the Government of Kenya, which now funds substantial proportions (with bilateral resources) of current work in the higher intensity dairy systems in other parts of the country. In real terms, however, dairy production on the coast makes up only a small percentage of total national production, and adoption of interventions has been low.

The case study now underway specifically tests the following hypotheses:

1. Smallholders tend to adopt innovations as a package rather than singly.
2. The decision to adopt innovations can be explained by the following variables: farm related variables, e.g., security of land tenure and number of acres owned (farm size), herd size, and use of other feed balancing technology; financial factors, e.g., availability of credit, market factors, e.g., quality of infrastructure and access to markets, milk pricing and processors policies; local conditions, e.g., high incidence of disease (vector borne diseases) and low productivity as a result of open grazing system encouraging zero grazing, and agro-ecological zone; extension services; e.g., services are rendered to adopters and potential adopters only, and; operator characteristics, e.g., age, gender, education, years farming, perception of risk.
3. Adoption of innovations leads to intensification of production, leading in turn to improved quality of life

Key Personnel
ILRI – P.K. Thornton,
KARI – Elamin Elbasha, Lutta Mohammed
Kalifi Plantations
Veterinary Department

Study 7
IPGRI - Crop Descriptors Lists (DL)
The International Plant Genetic Resources Institute is studying adoption of the IPGRI descriptor lists and their influence upon the conservation and use of genetic resources of two specific crops (main and minor more recent crop), throughout the CGIAR system.

For optimal conservation and utilization of plant genetic resources, basic data should be available for each germplasm accession such as identification data (passport descriptors) and basic morphological and agronomic characters (characterization and evaluation descriptors). In order to facilitate and standardize the description of

different crop species, IPGRI (and its predecessor IBPGR) has published Descriptors Lists (DL) for many important crops. The first crop DL was published in 1977 on cultivated potatoes; the number of DL published currently amounts to 78, covering a wide range of crops. Crop descriptors are produced in close collaboration and consultation with NARS, CGIAR collaborators and other crop experts. The DL provide a comprehensive range of descriptors from which individual users select the ones that are the most useful to them in the management and utilization of their collections. Through the development of DL, IPGRI aims to stimulate the documentation of germplasm collections. These standards provide the basis on which data exchange between gene banks can be organized. Current demand for new crop DL is very high with requests for 40 new titles and 19 revisions. IPGRI DL have a high visibility and their use is cited by a majority of gene banks. However, information is lacking on the extent of the use of the DL, on perceptions of their quality and the impact they may when used directly or indirectly as guidelines for germplasm documentation.

Thus, this study seeks to gain: clear understanding of the extent of adoption, clear understanding of the constraints affecting adoption, assessment of the impact of adoption and non-adoption of DL, and feedback to provide feedback for development of future DL
Key Personnel
IPGRI – Lindsey Withers, Brigitte Laliberte

Study 8
IPGRI -International MUSA Testing Program (IMTP) of INIBAP
IPGRI is also studying factors affecting the successful adoption of IMTP varieties among small farms in Latin America and Africa. The program aims to understand critical factors likely to enhance adoption in meeting local needs.

The IMTP was initiated by INIBAP in 1990 in response to a need to provide small farmers in Latin America and Africa with banana and plantain varieties resistant to the serious diseases affecting production. Initial attention was given to Black Sigatoka, with more recent inclusion of yellow Sigatoka and Fusarium wilt in the program. No more than 5% of the widespread popular cultivars are known to be resistant to black Sigatoka. However, the solution cannot be found solely in the global propagation of the few known resistant/tolerant cultivars because the potential evolution of the pathogen may yield strains able to overcome the resistance of a few widely cultivated varieties. Moreover, local tastes and uses vary from region to region. Further problems are that, (1) due to the nature of the crop, the genetic improvement of Musa requires an unusually high level of resources and scientific expertise; and (2) for testing to be carried out safely, there is a requirement for germplasm to be disease indexed and exchanged in in-vitro form.

Very few national programs have the necessary resources to embark on a Musa breeding program and no system was in place to allow the wide-scale testing and evaluation of the promising resistant material produced by the few existing breeding programs. Therefore prior to the development of the IMTP only limited international exchanges of germplasm had taken place. The program seeks to coordinate the development and evaluation of new germplasm to meet local needs. It also seeks to

increase national capacity to carry out research, breeding and evaluation of banana and plantain for local consumption. Therefore, the study will examine the chain of events and elements linking banana/plantain breeders and farmers to identify critical points likely to influence the flow of germplasm, acceptance of the germplasm by farmers and the extent to which farmers needs are met.
Key Personnel
Musa breeders
INIBAP/IPGRI Headquarters and regional staff
INIBAP collaborators in national programs

Study 9
CIFOR - Criteria and Indicators for Sustainable Forest Management
The Center for International Forestry Research (CIFOR) is studying factors affecting adoption of Criteria and Indicators (C&I) for sustainable forest management in Germany, Indonesia, Cote d' Ivoire Cameroon, and Brazil. The general objective of this study is to evaluate the validity of using a criteria and indicators based approach to evaluating sustainability of forest management at the management unit level. In particular, the study aims to discern more clearly between sustainable and unsustainable forest management practices and enable greater productive use of forests.

The project selected the four sites to represent the three tropical zones and one temperate zone during this first phase. The study will integrate knowledge-based technologies including; operational sustainability assessment 'tools' and decision support systems to facilitate holistic appraisal of sustainability. These research elements will contribute towards the development of a system to evaluate the sustainability of forest management. This system will have the potential to meet the needs of a variety of 'target' audiences (forest managers, certification and trade bodies, technical cooperation and development agencies). Moreover, interventions for different 'target' groups to promote the use of research outputs will be attempted and subsequent use of technologies (adoption) will be studied.
Key Personnel
CIFOR – Mike Spilsbury, Ravi Prabhu, Carol Colfer, Tim Boyle
International Project Advisory Panel
Project Scientific Support Group (of C&I Research Project)

Study 10
ISNAR - Strengthening planning, monitoring and evaluation in LAC
In the context of an ongoing study, ISNAR is developing a case study taking a wide perspective on assessing institutional adoption and impact strategies. The study design is currently under development. However, the results should be useful in providing an overall perspective to the set of adoption studies. In particular, this study may provide a wider framework within which some of the specific findings can be better understood.
Key personnel:
ISNAR - Douglas Horton,Ron Mackay

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APPENDIX 1

WORKSHOP ON CASE STUDY METHODOLOGY

Consultative Group on International Agricultural Research
Rome, Italy
Feb. 18-20, 1997

Workshop Leaders: Lee Sechrest, Ph.D.
Michelle Stewart, MA
Timothy Stickle, MA

Outline

The format of the workshop is flexible. In general, when a topic is specified, it will be introduced by a brief presentation, which will be followed by questions and discussions related to the needs and interests of those developing case study plans. Throughout the workshop, emphasis will be placed on formulation of strategies and methods for the individual case studies that will be refined iteratively as the workshop proceeds. The workshop is based on the premise that everyone will have read the "Effective and Persuasive Case Studies" document, and our discussions can take off from there. It is our expectation that by the end of the workshop, every case study leader will have worked out a plan for carrying out the case study and that we will have an agreed upon protocol that will keep everyone on schedule. In addition, we will have developed plans for subsequent synthesis and dissemination of case study results.

Feb. 18
Origins of the workshop study
Nature and types of case studies
Causal inference and the case study
Case selection and its rationalization
Threats to the validity of causal inferences
Identifying data needs
Data sources and data collection
Developing a strategic approach and protocol
Costs of case studies and setting boundaries

Feb. 19
Identifying and defining cases: group discussion
Synthesizing case study findings
The parallel case studies
Breakout sessions on individual projects
Identifying staff needs, training requirements, and resources

Feb. 20
Overall plan and timeline
Developing a joint protocol
Breakout sessions on individual projects
Plenary session: overview and final plans
The role of the Arizona team
Interim reports
Plans for dissemination

APPENDIX 2

ISSUES TO BE ADDRESSED ACROSS ALL CASE STUDIES FOR SYNTHESIS

The issues listed here should be considered by all sites for inclusion in data collection efforts. Not every issue is likely to be fully dealt with by all sites, but it will be helpful for every site to give careful thought to each issue. Moreover, it will also be helpful for each site to give positive indication of its thinking about each issue so that at the time of the synthesis we will be able to document the basis for conclusions that are proposed.

Affordability

Innovations must be affordable if they are to be widely adopted by farmers. Affordability may come about in several different ways. Some innovations may be inherently inexpensive, some may be subsidized fully or in part by outside agencies, and some may be provided without cost. It is important for each innovation studied to have some estimate of the expense involved in adoption and a description of how and how well the issue of affordability was managed.

1) Was the innovation inherently affordable? If yes, explain.
2) Was the cost of the innovation subsidized? In what way? By whom?
3) Were loans made available to farmers? If yes, what were the terms that made the loans affordable?
4) Were subsidies and/or loans available to all interested farmers? If no, how were they distributed, e.g., individuals were selected, a lottery, application? What were the specific criteria used?
5) What was the relative cost burden to farmers in local monies? Considering the local economy, how expensive was the innovation finally?
6) What might have been done to make the innovation more affordable if unaffordability was a likely impediment to adoption?

Involvement of NARS

The extent of the involvement of NARS in the dissemination and adoption process is of considerable interest. It is important to know the extent to which the NARS in each country was involved in identifying the original problem meant to be addressed by the innovation, the planning and development of the technology required, and in the formulation and implementation of plans for dissemination and promoting adoption.

1) At what stage(s) were the NARS involved?
    a) identification of problem
    b) planning of technology
    c) development of technology
    d) formulation of plans for dissemination
    e) implementation/promotion of adoption
    f) maintenance of adoption
2) Describe level of NARS involvement at each stage and add any comments on this involvement in any way that might enhance our understanding of this process.
3) To what extent did the involvement or noninvolvement of NARS affect the adoption process and the ultimate level of adoption achieved?
4) Are there any indications of ways in which NARS involvement might have made the adoption process easier and more successful?

Involvement of Farmers

It is also important to know the nature and extent of the involvement of farmers at each stage of the process of improving farming techniques. Specifically, it would be desirable to know whether farmers were involved in the original identification of the problem, in planning for its solution, and in formulating plans for ultimate dissemination and adoption of the technology.

1) At what stage(s) were farmers involved in the adoption process?

a. identification of problem
b. planning of technology
c. development of technology
d. formulation of plans for dissemination
e. implementation/promotion of adoption
f. maintenance of adoption

2) Describe the role of farmers at each stage and how they became involved. Were there a small number of farmers or a large group? Add any comments on this involvement in any way that might enhance our understanding of this process.
3) To what extent did involvement or noninvolvement of farmers have an effect on the adoption process and the ultimate extent of adoption achieved?
4) Are there any indications of ways in which involvement of farmers might have made the adoption process easier or more successful?

Degree of disruption

Some agricultural innovations require very substantial disruptions in the ways in which farmers adapt to the demands of their culture and environment; other innovations may require little, if any, changes in daily routines. It will be helpful if each case study site tries to make some estimate of the degree of disruption that was probably required by the innovation being studied and then shows how any disruptions were managed, either by promoters of the technologies or by the farmers themselves.

1) Describe the degree of disruption that was required by the adoption under study.
2) Describe the nature of the disruption to the farmers' routines, environment, culture, etc.
3) Descrbe the effect(s) of disruption on the adoption process.
4) To what degree did this disruption hinder the adoption process?
5) Include any descriptions, statements from farmers, and other information that describes the effects on adoption.
6) Are there any indications of ways in which the effects of disruptions might have been mitigated and that might have made adoption easier or more likely?

Risk entailed by adoption

We would like to know the nature and extent of any risks to farmers that were entailed by proposed innovations. Risks may have been economic, but they may also have been of other sorts of consequences, e.g., loss of face through failure. Some of the risks may have been quite real, but others may have been more psychological in nature. Knowing how risks were assessed, whether and how they were explained to farmers, knowing how they were encountered, and so on will be of great potential interest.

1) Rate the degree of risk to farmers posed by the innovation. What were farmer's perceptions of this risk?
2) Describe the nature and extent of the risk that was entailed by the innovation under

study. It will be important to estimate both the real risks (as best we can see them) and the risks as perceived by farmers.

3) Please describe the effect(s) of risk on the adoption process.
4) Describe any attempts by the center or NARS to minimize risk or perception of risk.
5) Include any descriptions, statements from farmers, and other information that describes the effects on adoption.
6) Are there any indications of steps that might have been taken to reduce risks or change perceptions of them in ways that might have made adoption easier or more likely?

Reversibility of adoption decisions

Whether and how easily adoption decisions may be reversed is likely to be related to the readiness with which adoptions are achieved. In the United States, proposed innovations very often carry the protective assurance of "money back guarantee" or "you must be satisfied" that are intended to make attractive a trial of something new. Reversibility is likely to be related to perception of risk, but promoters of new technologies could devise any number of ways to enhance reversibility. How reversibility questions are dealt with should be interesting and is definitely important. For example, with a cultivar, the decision is reversible each year when deciding what to plant. Machinery could be abandoned at virtually any point if the old technology were still available. The effects of reversibility may be positive, that is it may enhance risk taking and adoption. Conversely, the effects of reversibility may be negative, i.e., abandoning the technology was simply too easy and adoption was hindered despite at least reasonably positive early results.

1) Describe the reversibility issues as they may have affected the adoption process and its success. For example, to what extent was the adoption reversible and at what point and after what investment?

2) What proportion of adoptees reversed their decisions at the first opportunity (e.g., after 1 year) and later?

3) If the adoption could be reversed virtually any time, please provide information on patterns of reversing: that is, what was the "reversal rate" once adoption had occurred? (i.e., 10% per month)

4) Provide information and description on the effects of reversibility on adoption. Especially if reversibility seemed an easy possibility, did that seem to facilitate adoption? And if reversibility seemed difficult, did that loom large in the adoption decision process?

5) Are there any indications of steps that might have been taken to alter either the realities or perceptions of reversibility and that might have affected the adoption process and its success?

Incremental vs. step-wise adoption

Innovations are probably more easily adopted if it is possible to do so on an incremental, i.e., gradual basis. Adoptions that must be made in a step-wise, or all or none, manner are likely to be difficult. An assessment of the degree to which it was possible for farmers to "buy into" innovations gradually, perhaps trying them out in a

small scale or building them up in a piecemeal fashion is of interest. Whether any steps were taken to foster incremental adoption, e.g., by loan of technology, by partial subsidy, etc. would be important to know.

1) Was it possible for farmers to try the innovation on a small scale? How was this made possible? Who suggested the incremental approach – the farmers themselves or researchers?
2) If tried on a small scale, did this lead to a later increase in adoption? For example, after trying the new cultivar in only one section or field, was a farmer more likely to increase the amount of land devoted to it?
3) Is it possible to estimate the percentage of farmers who tried the new product in an incremental fashion. What percentage made the decision to adopt completely, and not just partially?
4) Are there any indications of ways in which incremental adoption may have been made easier and that might have affected the adoption process and its success?

Demonstrated effectiveness of innovations

The likelihood that an innovative technology will be adopted is almost certainly related to the extent to which its effectiveness has been directly demonstrated to potential adopters. "Demonstration" may range all the way from testimonials to on-site, hands-on trials. Similarly, demonstration may be very brief, like a try-out drive of a new automobile, or extended as in a season-long test plot of a new cultivar. Moreover, demonstrations may be planned by promoters of a technology or they may be by-products of other activities. Information about demonstrations of the effectiveness of innovations being studied should be available, and it is important that it be assembled for later synthesis.

1) What demonstrations or other evidence of the innovation's effectiveness were offered to potential adopters? Were these in vivo or presented as printed materials or in some other fashion? Where did farmers get their information regarding the innovation?
2) Who was responsible for presenting the evidence to farmers, or conducting presentations? How were these individuals trained? Were they outsiders, or members of the local community?
3) Was the innovation available for testing before the farmer committed to investing in it? Was this testing aided or supervised in any way?
4) Is there any information to indicate how the demonstrations were received by potential adopters? Have attendees rate how persuasive they were.
5) What other methods could farmers choose from? Were there many competing innovations that could have resulted in confusion?
6) Are there any indications of ways in which effectiveness of adoptions might better have been demonstrated to farmers and that might have affected the adoption process and its success?

Involvement of opinion leaders

One of the most widely used ways of introducing innovations and increasing the rates of their adoption is the involvement of "opinion leaders" early in the adoption process. Opinion leaders in the case of farmers may be taken to be those farmers who are well known and respected by their peers, especially if that respect is related to a reputation for success in farming. Whether and how opinion leaders may have been used in promoting the agricultural innovations being studied is of great interest.

1) Were opinion leaders identified and recruited for participation in the communities? Who organized their efforts? What type of training was involved? Were they compensated?
2) What was their role in introducing the innovation? Did their audience perceive them as credible?
3) What strategies did opinion leaders use for disseminating information in their respective communities? Did they develop these in consultation with the center or NARS? Is it possible to get an estimate of the number (or percentage) of farmers they spoke with? And subsequently how many of these went on to adopt the innovation?
4) Are there any indications of ways in which opinion leaders might have been used more effectively to make the adoption process easier or more successful?

Collective support for change

Change is more likely if it is collectively supported. That is, innovations are more likely to be adopted if it is perceived that there is widespread support for them and that many other persons will be changing at the same time. Efforts to induce the perception that "everyone is doing it" may facilitate adoption of innovations, and any efforts made to produce that sense of support in relation to the agricultural innovations in question would be of interest.

1) Was there a sense of "everyone is doing it" ? If so, was this an accurate perception or a tactic to encourage adoption? If this was done to encourage adoption, how was the impression spread?
2) Do farmers report being aware of other members of the community adopting the innovation, or the extent of adoption in their communities? What means of communication did they share with other farmers in the region?
3) Was there a local farmer's organization that supported the adoption? How involved were they in the dissemination?
4) Is there evidence that the decision among adoptees was made close together in time? I.e., did adoption happen in a groundswell, or trickle fashion?
5) Are there any indications of ways in which farmers might legitimately have been influenced by fostering a sense of mutual and widespread support so as to have made the adoption process easier and more successful?

Initial Plan for Dissemination

Successfully adopted innovations may be partly the result of a well-planned dissemination effort. The nature of the original plan for dissemination of the innovation should be detailed.

1) Was there a plan for the original dissemination or marketing effort? If so, who was responsible and what factors did they take into account in designing it? Was it a collaborative effort between the center and another entity such as private enterprise or NARS? Was this plan feasible? Did it require funding or enormous quantities of labor?
2) Were any modifications made to the original plan? How was the decision made to change the plan? Was this in response to local conditions or feedback from the community? Did changes in the plan affect adoption rates?
3) Were there targets set for adoption? E.g., was the goal to have adoption in 80% of the farms?
4) Ask people involved in the planning and execution of the dissemination effort to

rate how effective it was. Was it carried out in the field according to the plan? Were dissemination activities supervised? Is it possible that the plan was not fully carried out?

5) What is the present dissemination plan? How does it compare to the original?
6) Are there any indications that a more definite and better dissemination plan might have made the adoption process easier and more successful?

Binary Vs. Continuous Nature of Adoption Decision

The adoption of some innovations is a one-time choice that can be described as a binary, i.e., adopt/no adopt, decision. Other innovations, by contrast, require continuous decision-making to maintain use. For example, the purchase of a piece of equipment can be viewed as a single binary decision made at one point in time, while the use of seeds entails making a decision every growing season. A one-time decision may make it more likely that the farmer will continue use; innovations requiring on-going decision-making may provide more opportunity for adoption to fail.

1) Was the adoption one-time decision , or did adoption require periodic decision-making to maintain commitment to adoption? What types of on-going decisions were required and how often must farmers make these decisions?
2) Is there an escalation of commitment that makes it unlikely for farmers to discontinue use at a later decision point? What factors do farmers identify as important in this escalation of commitment?

Task difficulty

It is potentially useful to have some idea about the "task difficulty" involved for each dissemination being studied, and it is also likely to be useful to have an idea about what level of success could have been achieved under a best-case, but realistic scenario. Let us take these two matters in order. Some dissemination tasks are inherently easy. For example, we would guess that if the cultivation of marijuana were to be made legal in the U.S., almost no effort at all would be required to achieve virtually complete dissemination. Other dissemination tasks are inherently difficult. To take another example involving drugs, it has proven to be extremely difficulty to disseminate (i.e., with adoption) among Peruvian farmers the idea of replacing the cultivation of coco with the cultivation of some other agricultural crops. It has been similarly difficult to persuade tobacco growers in the U.S. that they should consider growing something like strawberrries instead. Task difficulty is, obviously, a continuum, and in between two extremes, like those we have mentioned, are all levels of difficulty.

We have in mind here the difficulty facing the disseminator(s), not the difficulty facing the farmer or other adopter, although the two are likely to be related. Task difficulty will depend on all sorts of things, e.g., the characteristics of the innovation, the context in which dissemination efforts were carried out, and so on. For example, political instability or bad economic times might make an otherwise fairly easy task in fact quite difficult. Moreover, task difficulty can, we think, only be judged in retrospect, i.e., after all the facts are known.

Case study investigators are asked to think about this aspect of the innovation problem and, as they go along, to try to assemble relevant information that would bear on a final judgment. Then at the end of each case study, we the team will be asked to make judgments about the difficulty of the task as they see it at that time, in retrospect. That

judgment will be expressed for in the form of both impressions and judgments on a series of quantitative scales.

A second question, related to the task difficulty question, calls for consideration of what level of dissemination might have been achieved with more nearly optimal, but still realistic effort. To illustrate, let us suppose that farmers were offered $10,000 to adopt the innovation in question. The adoption rate would almost certainly be nearly 100%. Therefore, we can conclude that adoption of each of the innovations could be achieved. But, an intervention of $10,000 per farmer is not realistic. Nor would be providing each farmer with an individual extension agent. The task we want to undertake is to try to sketch out for each innovation what might have been a realistic optimal dissemination plan and then to estimate what level of adoption might have been achieved had such a plan been carried out. Optimal plans would differ from one innovation to another and probably from site to site for the same innovation. Figuring all this out will not be easy, although we do think it will be interesting. Then all this should lead to a judgment, again by methods yet to be devised, of what might have been achieved under best case conditions. We assume that, for a variety of factors having to do with the nature of the innovation and the conditions existing at the time of its introduction (or your study), adoption would not have been complete even under the best of (realistic) conditions.

Gender Issues in Agricultural Innovations

Gender issues are at the forefront of concerns about economic and social conditions in developing countries, and how women might be or are affected by agricultural innovations is of distinct interest. Certainly no one wants to make the conditions of women worse, and, in general, it is to be hoped that agricultural research will result in improvements in the lives of women in underdeveloped and developing countries. Generally, we are examining adoptions of innovations to determine whether the situations of women have been improved, but that is a narrow view. We aim to broaden the topic by examining several other relevant questions:

1) Were men or women chiefly responsible for making the decision to adopt the innovation?
2) To whom was the innovation targeted or marketed – men or women?
3) Which gender is primarily involved in using the innovation?
4) Were there any changes in the division of labor between men and women as a result of adopting the innovation? Were there any impacts on workload for either sex? For example, in one study of adoption of a new crop, both men and women increased their workload; they wanted to cultivate more of the valuable crop to increase household income.
5) If there were economic benefits to the adopting households, who saw more of the benefit -- men or women? Is it possible to determine any change in income distribution between men and women since adopting the innovation?
6) Were children's experiences changed by the innovation? Did any of the changes relate to gender? Were there any changes in childrearing practices? For example, did fathers begin to stay with children so the women could spend more time working in the field? Or did reduced workload for children allow more time for school, but only the male children were allowed to go to school while the girls stayed home to work? Did older children care more for the younger children and how did this relate to changes in work load/patterns?

7) Considering the overall quality of life of adopting households, are the lives of men better off, about the same, or worse? Are the lives of women better off, about the same, or worse? In what ways are their lives better or worse?
8) Have the respective roles of men and women within the family or community been impacted by the innovation? The changes in gender roles within the family and/or community may be obvious, or they may be more subtle.
9) Were gender issues involved in the design/planning of the innovation you are studying? If yes, how were these issues taken into consideration?
10) For those sites conducting interviews in the field, were respondents primarily women or men? Do you think this may introduce bias into your findings? Was it possible to include both men and women in the samples?

Certainly we want to know if the situation of women has been improved, but we also need to capture some of these other related issues. Each site is urged to consider how gender issues might be involved in their case study project and to incorporate them into the study design. Given that gender is an area of vital interest to all the centers, it will definitely be an area for potential cross-study synthesis. Gender issues may not be relevant for all the studies, but all sites should be able to articulate their rationale for either excluding or including consideration of gender-related issues.

What we will be looking for are overall impressions and judgments at the end of the study. Such judgments will be subjective, but they will also be substantially informed and, therefore, valuable. Or at least so we think.