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The Roles of CRSP Social Scientists in Technology Evaluation and Generation

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The objective of the CRSPs is to develop new technologies for Third World farmers and stockowners in order to increase food availability and income. One lesson learned from the green revolution is the importance of socioeconomic factors in agricultural R&D. Research policies now emphasize the social acceptability and economic profitability of technological innovations, as well as their biological or technical soundness. Today, socioeconomic analysis is encouraged, sometimes even mandated or taken for granted, as an integral component of the process of technology design, testing, and delivery.

This has led to new programmatic methods, most notably farming systems research and extension (FSR/E). Most of the CRSPs have utilized this new approach. FSR/E attempts to improve existing farming systems by means of technology. Specifically, it develops technologies *needed* by producers and *adapted* to their farms. It has been described as a multidisciplinary approach to small farm analysis, with social scientists participating in the ex ante evaluation of new farming systems or technologies (Norman 1978). But social scientists should and do play a number of different roles in the development of new technologies.

TECHNOLOGY EVALUATION

Technology can be broadly defined as a way of doing things. "New technology" implies a "better" way of doing things, or, in the context of international agriculture, a better way of farming. Better farming is farm management that brings producers closer to their goals, given their social, economic, and ecological environment. The decision to proceed with the development of a new technology implies that some evaluation of whether it is potentially "better" has been undertaken. Indeed, technology research can be regarded as a continuous process of technology design and evaluation.

In this process, biological and social scientists have traditionally tended to view their roles as, respectively, the generation and the evaluation of new technology. Social scientists typically lack the technical skills to participate directly in technology generation. However, they are expert in perceiving and analyzing the social and economic environments of producers. Hence, their crucial role in evaluation. A good example is DeWalt and DeWalt's (this volume) discussion of the introduction of new sorghum varieties in Honduras.

But, evaluations can be done in different forms and at different times. In fact, the roles of social scientists in this regard, as in the development of new agricultural technologies generally, have been changing and expanding (see Lipner and Nolan this volume).

While the importance of sociological variables in successful technology development has long been recognized, for some decades social analysts' input was generally incorporated only at the end of projects (ex post) to explain why things went wrong.[1] DeWalt (this volume) presents a classic example of this ex post role in his review of the Mexico Agricultural Program and its successors, where studies by social scientists were conducted after the fact. His chapter illustrates the loss of resources that resulted from the lack of ex ante analysis, as well as the limited impact of the ex post analysis.

During the last two decades, the pendulum has swung away from social scientists' participating solely in ex post analyses toward their becoming the preliminary (ex ante) investigators in applied agricultural research. For example, it is important to delineate the potential end-users of a given technology before it is designed or evaluated. Indeed, this is what determines the criteria for socioeconomic evaluation. Social scientists clearly have an important part to play in this definitional task (Jamtgaard; Uquillas and Garrett this volume).

More recently still, a consensus has emerged that social scientists should be involved *during*, as well as before and after, the entire process of technology generation. The timing of social analysis is critical if it is to have any impact. On technology-generating programs such as the CRSPs, therefore, social scientists now provide ongoing monitoring and feedback, as well as "before" and "after" evaluations of new technologies.

Today, anthropologists and sociologists also play a unique role as "brokers" between biological scientists who generate technologies and producers who ultimately use them.[2] Part of this role includes participating in on-farm experimentation and facilitating implementation of the research design (e.g., Cattle; Paolisso and Baksh this volume). However, the role of intermediary is difficult. It calls for understanding the beneficiaries, the technologies they currently use, and the new technologies being developed. In addition to being timely, the information that intermediaries collect must also be presented in the proper language—that is, in language that is comprehensible to scientists of other disciplines and, in the case of critical observations, diplomatic. Understandably, biological scientists have not always welcomed such observations. Many have been discouraged by negative social scientific evaluation of "their" new technologies. Many also question whether social scientists really provide a service, rather than an obstacle, to their work.

TECHNOLOGY GENERATION

Although the usefulness of the social sciences in technology evaluation is now recognized, technology generation is still considered the domain of biological scientists. This stance is linked to two main views of the technology generation process: "one step" and "black box." Both ignore the importance of participative approaches to technology generation.

One Step

Biological scientists often mistakenly view technology generation as a one-step process, a "eureka" experience. The FSR approach organizes research activities in phases: descriptive/diagnostic; technology development; evaluation; and then extension (Uquillas and Garrett this volume). This concept of research programming reinforces the idea that technology development is a one-step (one stage/phase) process. In this paradigm, social scientists often find themselves stuck in the first phase: description (Coughenour and Reeves this volume).

Contrary to the standard FSR model, however, in reality technologies develop slowly and with marginal improvements over time. Technology generation is thus a continuous process of redesign and evaluation. In consequence, evaluation can take many forms, as displayed in Table 16.1.

It is evident from an examination of Table 16.1 that social scientists can contribute to *all* stages of technological development—notional, preliminary, and developed. As a matter of fact, involving social scientists and producers during the notional stage (e.g., during protocol or proposal discussions) leads to more efficient use of research resources. Although the FSR approach has proved very useful in integrating biological and nonbiological scientists within the CRSPs, the social sciences could doubtless have even more impact if a technology development paradigm were adopted instead.

TABLE 16.1. FSR EVALUATION METHODS AND THE STAGES OF TECHNOLOGY DESIGN

Stages of Technology Design	Most Cost-effective Evaluation Method
Notional	Intuition Informal discussions Formalized discussions
Preliminary	Laboratory experiments Research-station field experiments Budgeting
Developed	Computer simulation experiments Unit-farms experiments Researcher-managed on-farm experiments Farmer-managed on-farm experiments

Source: Menz and Knipscheer 1981.

Black Box

Unfortunately, biological and social scientists alike share the conviction that the latter are not technology generators. This conviction can reduce the role of the social scientist to that of messenger—the bearer of good or, more often, bad news. This idea coincides with the view that social scientists' main role is brokering, or, as Paolisso and Baksh (this volume) formulate it, "articulation of areas of interest to biological scientists."

Actually, though, we know very little about how technologies are generated. Our ignorance in this area fosters a "black box" notion of the generation process, with biological scientists as the magicians. Yet defining the "magicians" or technology generators so narrowly excludes not only social scientists from the technology innovation process, but also the end-users.

Participative Approaches

Recently, the importance of input form producers into the technology design process has been acknowledged (Chambers 1985). Farmers and herders control large bodies of indigenous technical knowledge of their own. As one expert in this area observes:

> In most countries of the third world, rural people's knowledge is an enormous and underutilized national resource. . . . [T]here are innumerable skills and well-informed local experts. . . . Knowledgeable rural people are disregarded, despised, and demoralized by urban, commercial and professional values, interests and power.

> For them to be better able to participate . . . one first step is for outsider professionals, the bearers of modern scientific knowledge, to step down off their pedestals, and sit down, listen and learn (Chambers 1983:92, 93, 101).

This stance acknowledges that farmers are experts on their own existing technologies and that they can directly contribute to the design of new ones. But this stance challenges the "magical" status of biological scientists (and their black box), as well as the position of social brokers, who suddenly find themselves wedged between two expert groups. Of course, social scientists, particularly anthropologists, are trained to overcome and communicate across such cultural boundaries. Yet even with this training, does the intermediary understand the technology she/he is talking about?

Ultimately social scientists can play a significant role in the process of technology development only by becoming subject-matter semispecialists, capable of translating between two expert groups. Several authors in this volume (e.g., Coughenour and Reeves) pay lip service to the need to follow the research of their biological colleagues. But only McCorkle offers a clear-cut example of a social scientist who becomes a subject-matter semispecialist, and who is therefore able to involve biological scientists and producers in a problem-solving dialogue.

Problem solving is what technology generation is all about. Producers can and should participate in problem solving both to select and to adapt new technologies to suit their needs. Kirkby and Matlon (1984) have provided excellent guidelines on how to engage producers in this process. The first guideline is to earn producers' respect.

LESSONS LEARNED

In light of the above discussion, how well have CRSP social scientists played their brokering role, be it in the old, ex post evaluation mode to in the new, continuous-involvement mode? To obtain an overview of the role and impact of CRSP social scientists in technology development, I have classified the studies described in this volume according to their technological orientation (Table 16.2). The chapters are groups by the following questions:

- Was the study oriented toward technology development?
- If yes, was it conducted in a multidisciplinary mode?
- Did the study involve producer participation?
- If yes, was this participation passive (e.g., only responding to questionnaires) or active (engaging in dialogue and problem solving)?

TABLE 16.2. CLASSIFICATION OF CRSP SOCIAL SCIENCE RESEARCH

	Technology Development Orientation		Producer Participation	
Research Studies[a]	Unidisciplinary	Multidisciplinary	Passive	Active
DeWalt	*			
Lacy et al.	*			
Paolisso & Baker	*		*	
Jamtgaard	*		*	
Coughenour & Reeves		*	*	
DeWalt & DeWalt		*	*	
Cattle		*	*	
Ferguson		*	*	
Uquillas & Garrett		*	*	
Wheelock et al.		*	*	
McCorkle		*		*

[a]As reported by the contributors to this volume.

Table 16.2 indicates that CRSP social scientists generally have been well directed. All have interacted with other social scientists, on the one hand; on the other hand, they have also worked in tandem with specialists in sorghum, cowpeas, goats, or whatever. As set forth in this book, the experiences of the CRSPs illustrate the usefulness of this intra- and interdisciplinary interaction. At the same time, however, Table 16.2 highlights two general areas of constraints to social scientists' role performance: disciplinary and institutional.

In disciplinary terms, as brokers on technology development projects, social scientists are making career sacrifices. By becoming subject-matter semispecialists and by gearing their language and publications to a multidisciplinary audience, they have gained recognition within their CRSPs, but not necessarily among their academic colleagues. Disciplinary groups often do not reward multidisciplinary research, viewing it as marginal or "maverick." Worse still, they may even "punish" it (Heberlein 1988).

Conversely, technical/biological scientists sometimes criticize the work of their social science colleagues as overly disciplinary and contributing little to new technology development other than some general information. For example, as an economist, I appreciate the chapter by Wheelock et al. on income elasticities for peanut products. As the same time, I can see how biological scientists might argue that the research resources devoted to this analysis could have been better applied to generating information relating more directly to new technologies.

Nevertheless, Table 16.2 suggests that CRSP social scientists have generally done a remarkable job of participating in multidisciplinary research. They have largely succeeded in balancing their act between achieving longterm academic career goals and serving as effective brokers to biological scientists.

Of course, multidisciplinary team research is never easy. Regional projects are difficult enough; multinational projects are even more so. In order systematically to identify the primary research activities that need to be implemented by each discipline and to integrate the multidisciplinary information generated thereby, an analytic framework is essential. The FSR paradigm provides one such vehicle. Experiences on the SR CRSP show that in countries where the research team followed the general guidelines of FSR methodology, the program yielded the best results in terms of new technologies (although not necessarily in terms of numbers of research reports).

Institutional constraints also figure in the success of multidisciplinary efforts and the brokering process. One constraint is, typically, meager budgets for social science activities. The argument for this is that research institutions are technology factories; their primary mandate is technology generation rather than evaluation. They thus have an administrative bias that endows the technical/biological scientists with more status, power, control, and funds (Heberlein 1988) than are social scientists who, I claim, are often cast in a "service" role. It is one of the virtues of certain CRSPs that the social science component is explicitly written into the program. This helps overcome both institutional and cross-disciplinary bottlenecks.

An additional lesson learned on the CRSPs is that, in view of disciplinary, institutional, and other constraints, the sites where CRSPs have worked with only one host country agency (rather than multiple agencies) have usually been more successful. Separate multidisciplinary research funds and external evaluation panels have also served as counterweights to negative institutional biases.

CONCLUSION

CRSP social scientists have been involved in technology generation in many ways. The conduct of their research, its direction, and its integration with other disciplines have varied across CRSPs, collaborating countries, and principal investigators. In retrospect, however, a number of strategies have made for more effective social science inputs: application of FSR methods; explicit inclusion of the social sciences in program design; collaboration with a single, strong host country institution; favorable budget mechanisms; and continual monitoring of social science performance in relation to the program as a whole.

Still, there is room for improvement. CRSP social scientists can be even more effective to the extent that they mobilize producer participation in the multidisciplinary research endeavor itself. To date, we have usually involved producers only passively. I firmly believe that more effort by CRSP social scientists to stimulate producers' active participation in research would also have led to fewer budget constraints. Active end-user participation is critical because it is also the ultimate test of whether institutional constraints have been overcome.

Presently, the SR-CRSP is conducting innovative research in this more interactive mode in Indonesia and Peru. This approach to technology generation has increased mutual understanding and appreciation between scientists (both social and biological) and producers. The result is applied research that is directly geared to user needs. This has been one of the major accomplishments of the social sciences in the CRSPs.

NOTES

1. This situation resulted in part from anthropologists' and sociologists' earlier unwillingness to become actively involved in applied research (Sutherland 1987).

2. This broker, or intermediary, role is relatively new to anthropologists and sociologists, especially when one considers that the first social scientists involved in multidisciplinary research were mainly agricultural economists.

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