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THE ROLE OF EXTENSION IN FSR

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E X E C U T I V E   S U M M A R Y

The Farming Systems approach to Research (FSR) offers a means by which research and extension activities may be made more effective to address the farmers needs. FSR brings researchers in closer contact with farmers and extensionists and helps to integrate the processes of technology generation and technology transfer.

Extension scientists should participate as active partners throughout the FSR process. Their local knowledge can be helpful in defining recommendation domains, in the diagnosis of problems experienced by farmers, and in determining research priorities. By narrowing the social gap between researchers and farmers, extensionists can assist in ensuring effective two way communication. Their continued presence in areas targeted for research can help in making a series of farmer-managed trials possible and more cost-effective by taking over routine supervisory roles from researchers.

FSR can and should provide proven and more relevant technologies for extensionists to transfer. Their involvement from the initial stages of the research process helps to guarantee their commitment to extending the particular technology in question. Furthermore, the intimate understanding thus gained of the strengths and weaknesses of the technology under test means that the extensionist is in a position to speak with confidence and authority when transferring the technology to farmers.

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The principal objective of the MART/AZR Project is the institutional support and development of AZRI in the period 1985-1989. This series of research reports outlines the joint research findings of the MART/AZR Project and AZRI. It will encompass a broad range of subjects within the sphere of dryland agricultural research and is aimed at researchers, extension workers and agricultural policy-makers concerned with the development of the resource-poor, arid areas of West Asia and the Middle East.

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THE ROLE OF EXTENSION IN FSR

This paper explores the role of extension in the farming systems research (FSR) approach. It makes an overall implicit assumption that the active participation of extension workers in FSR enhances the output from technology generation and evaluation processes and leads to a more effective transfer of technology to farmers.

FSR: AN OVERVIEW

FSR is a research tool which stresses farmer participation in problem identification and the testing of improved technologies at farm level. The FSR concept has emerged parallel to the recognition that top-down research from experiment stations has only inadequately produced relevant technologies in terms of the goals, resources and constraints of small farmers[1].

Conventional research is organized along discipline and commodity lines, and is aimed at the full exploitation of biological potential in the semi-controlled environment of the experiment station. Technology generated in these conditions cannot necessarily be directly used in actual production activities. It remains an unfinished product unless it is tested in and adapted to real production systems and then integrated into these systems (Hildebrand and Poey, 1985).

Growing concerns about the suitability of research output for small, resource-poor farmers in the 1970's led to new perceptions and approaches to agricultural research which then were merged under the FSR standard. Although FSR programs have developed in different circumstances and have been implemented with varied approaches rather than following a strict blueprint; most FSR programs can still be distinguished by the presence of certain key features and research procedures.

FSR requires a thorough understanding of the bio-physical and socio-economic environment within which the farmer operates. For this reason, FSR begins with description/diagnosis which aims at identifying the farming systems in the target area, describing environmental factors which dictate options and constraints within these farming systems, and assessing farmers' activities, management decisions and goals in the context of a particular farming system. Given the complexity of farming systems and farmers problems, FSR work can only be carried out by "multi-disciplinary" teams. It provides a focus on the entire system rather than studying isolated components within the system (Waugh et al., 1989).

The output from the descriptive/diagnostic phase is used in designing technologies which offer the potential of solving farmers' problems and to exploit opportunities which exist within their resource endowment[2]. These technologies are tested and assessed on farmers' fields, under their conditions and using their assessment criteria. A range of on-farm trial types can then be used in sequence for evaluating and adapting promising technologies.

Farming systems are usually different spatially and also change over time. Therefore FSR has a thoroughly "locale specific" nature. Recommendation domains are identified in the target area and the technology evaluation and transfer activities are tailored to specific characteristics of each domain[3].

FSR proponents believe small farmers behave rationally and purposefully (e.g., Collinson, 1985). Attempts to observe and better understand indigenous knowledge and incorporate it into the base of scientific knowledge is given due importance in FSR.

Farmers' participation in activities and decision making processes is fundamental to FSR. Their input in problem identification, research planning, and technology testing and assessment are strongly encouraged. Therefore FSR adopts a "client-participatory" approach to agricultural research.

FSR cannot replace, but rather completes on-station research. It serves as a basis for evaluating the output from disciplinary and commodity research, in turn, the feedback from FSR is helpful in planning on-station research programs (Simmonds, 1985).

The operational procedures of FSR usually follow a sequence of stages: Description and diagnosis of the farmers' situation; research planning and technology design; technology testing and assessment; dissemination of technologies (Norman, 1980). The stages of FSR cannot be perceived as disjointed activities. They overlap in time, and iterating interactions occurred (Johnson III and Kellogg, 1984).

INTEGRATION OF EXTENSION IN FSR

FSR procedures offer an excellent device in bridging the gap between research and extension (Frankenberger, et al 1989). First, it creates a physical proximity, by bringing researchers from their experiment stations to real production areas where extensionists work. Second, it is a problem solving approach to research which focuses on getting relevant and proven technologies into the hands of farmers. This means a common interest, a common mission and mental proximity between researchers and extension workers. Last, but not the least, FSR is a client-centered, client participatory approach. The participation of clients in the technology generation, evaluation and transfer processes is the most important factor in linking research and extension (Talug, 1989).

FSR methodology covers an extension function as a last stage in its operational procedures. However, it does not mean that the extensionist should take his place in the action, after the technology has already been generated and evaluated. Technology generation and transfer should not be regarded as a separate and disjointed activities, rather these two functions should be combined to form an integrated process (Hart, 1983). Therefore, in order to ensure integration occurs and to obtain the full benefit from both functions, extension workers must necessarily be involved in FSR procedures from the beginning.

The Role and Contribution of Extension Workers in the Technology Generation and Evaluation Procedures of FSR.

1. Extension and Diagnostic Phase

The technology generation and evaluation procedures in FSR begin with the descriptive/diagnostic phase of studies. These studies examine the activities and decisions of farmers within a system perspective. The goal is to identify (challenges proposed) and (opportunities offered for improvement) by the bio-physical environment and exogenous socio-economic conditions (Collinson, 1985). In addition, initial agro-ecologic and socio economic characterization studies (recommendation domains) are undertaken in this phase.

The main tools used to obtain the desired information are informal surveys (rapid rural appraisal, reconnaissance survey, sondeo, etc.) and formal surveys[4]. The selection of appropriate tools and methods depends on the objective of the survey. Given FSR's problem solving nature, as well as time and cost considerations, there is a trend in favour of cheap and fast methods rather than the lengthy and expensive ones.

Extension workers, with their intimate knowledge about the target area, farming systems and rural life, can play a major role in descriptive/diagnostic studies. Experienced extension workers can act as key informants on local conditions and the local cultural context. Their contribution can thus be helpful in several aspects of data gathering.

They can contribute in survey designs which require a certain level of *a priori* knowledge of local conditions for the framing of the survey and for determining the right questions to ask. In informal surveys experienced extension workers can also be very helpful in finding appropriate survey locations and identifying suitable people for interview.

Their role may be more important in interviewing the farmers and interpreting their answers. Their familiarity with farmer attitudes, expressions and terminology ensure a greater effectiveness of communication. An extensionist who knows local cultural codes, the local calender, unit of measures, and who also has an appreciation of the researchers' objectives as well, can be a considerable asset in a multi-disciplinary FSR team.

Extension workers again can also be helpful in the assessment of survey results and in the identification of suitable technologies for on-farm testing. According to Simmonds (1985) "the opinions [and assessment] of experienced extension agents are sometimes more weighty factors than the statistical niceties."

2. Extension and On-farm Trials

On-farm trials are the core of FSR practice. Promising technologies are tested under actual production conditions in order to evaluate their agronomic viability, economic feasibility and compatibility with the farming system. It is not a simple replication of on-station experiments in plots rented from farmers. On-farm trials can be organized and supervised in a number of different ways. Matlon (1984) distinguishes six different levels of test to reflect variation in degrees of management and risks absorbed by farmers. Johnson III and Kellog (1985) mention extension-managed trials besides fully researcher-managed and farmer-managed trials or combinations of these alternatives.

The design of farmer-managed trials should be simple and purposeful so that farmers can easily observe and assess differences between the treatments. Large plots, with a limited number of treatments including the traditional practice as a control, are preferred. Farmers should be allowed some degree of freedom in their management, therefore, larger plots provide better opportunity to observe the farmers' own management practices and constraints (Matlon, 1984). The requirement for a larger number of plots across a research site is because of the need for "no replication" at farm level, rather farms are treated as blocks instead.

The large number of on-farm trials usually associated with FSR makes the cooperation of extension workers desirable in supervision and monitoring while the relative simplicity of the trials in terms of experimental design makes extension workers' contribution viable. In addition, as the extension workers already reside and work in the target area, their participation is the most cost-effective[5] way of performing on-farm testing. In fact, the role of extension is not limited to making larger testing possible in a cost-effective way, but rather in ensuring its success.

The assessment of the technologies under test by farmers is the most important input to technology evaluation through on-farm trials either managed by farmers or by researchers. It is a much more difficult task to create a real partnership with farmers and to obtain their genuine assessment of the new technologies under test rather than to design and lay out experiments and to analyze agronomic and economic data from the experiment statistically.

Farmers sometimes agree to cooperate for the sake of obtaining free inputs and in these cases often are reluctant to provide an adequate management, to record their activities, or to openly communicate their own assessment to the researchers. It is evident that sometimes they can be biased towards certain treatments in the light of input expectations or other reasons[6]

The selection of cooperative farmers is an important issue. They should represent a cross section of the community and the involvement of the community should be secured in their selection. Tripp (1982) points out that rotation is required between sites and farmers over years. To change farmer cooperators without creating conflict can be a very sensitive issue as extension workers may have experienced while working with "contact farmers" in extension programs.

On-farm trials cannot be a very efficient tool for technology evaluation unless farmers fully understand the aim of the trials and they perceive those trials as being in their own interest (Hildebrand and Poey 1985). The most critical factor is to develop mutual respect, trust and a good working relationship with farmers.

Extension workers are potentially able to help both researchers and farmers in developing a mutual understanding between them. They can narrow the social distance and communication gap that naturally exists between researchers and farmers. They have experiences in common with both researchers (educational experience) and farmers (work experience)[7]. Their professional education provides them with better communication skills and greater sensitivity to social issues.

Therefore, besides providing the necessary manpower in conducting on-farm trials, extension workers can contribute to the success of the trials by playing a most important role in the proper selection of cooperative farmers, in securing their full participation in the technology evaluation process and in obtaining their genuine assessment of new technologies.

How Does the Participation of Extension Workers in FSR Technology Evaluation Activities Enhance Technology Transfer?

To be successful, extension agencies have to have relevant and proven technologies to help solve their clients' problems. FSR represents the best available approach to improve the relevance of research which has been a critical constraint to extension work in developing countries to date.

FSR technology evaluation and adaptation procedures can lead to well-defined and well-conditioned extension recommendations. Multi-locational testing and verification across different recommendation domains, provides information about; (a) in which agro-ecologic environment and specific socio-economic conditions the new technology is applicable, and (b) what variations of the technology are acceptable within different farming systems and resource endowments (Hart, 1983).

The active participation of extension workers in the technology evaluation and adaptation process provides a strong basis for the effective transfer of these technologies. Participant extension workers can fully understand how technologies work and gain confidence for relaying technical instructions (extension recommendations) about these specific technologies. They become promoters of the technologies that have been developed partly by their own efforts. This provides an important motivation that does not normally exist when they disseminate technologies simply given to them by researchers.

Furthermore, participant extension workers can more effectively communicate and demonstrate the technologies to farmers. They will already have had first hand experience of farmers' responses to the technologies during the on-farm trials. They can thus easily envisage where they may be faced with problems in convincing farmers, and which impact points can be used to tackle possible communication problems. Also, some of the verification trials can be directly used as demonstrations (Denning, 1985).

FSR is able to enhance extension work, not only through on-farm trials, but also through descriptive/diagnostic studies. The participation of extension workers in this phase of FSR can lead to a better understanding of farmers' needs and problems by extension workers through scientific and systematic procedures for data collection and analysis rather than merely depending on their own ad hoc observations. Biological and social scientists in FSR team can together open new horizons to extension workers in making a better identification and appreciation of the farmers' actual situation.

There is always "existing useful knowledge" either scientific or indigenous, which can respond to the needs and conditions of farmers. Involvement in FSR provides better opportunities to access this knowledge for direct incorporation into extension programs.

The diagnostic/descriptive stage of FSR is also helpful in developing appropriate extension strategies and methodologies. WARDA, has integrated the development of extension strategy into its research mandate by recognizing the potential of FSR procedures in this field (Prakah-Asante et al., 1984). In addition, this point is supported by Denning (1985), "With some adaptation of the descriptive phase of FSR, the information gained can serve not only as a basis of more relevant research, but also as a reference in designing *locale specific* extension strategies."

IMPEDIMENTS TO INTEGRATION

A technology transfer dimension has been accorded a place in FSR methodology, but has yet received little attention in FSR literature and the situation has been even worse with FSR in practice. The technology transfer function has mostly existed only in project papers and FSR practice has only recorded a few successful examples of the integration of this function to technology generation and evaluation. In parallel, the merits of FSR in eliciting relevant technologies and in stimulating the dissemination of these technologies were not recognized by extension planners and managers. Consequently, extension practice has been generally unable to incorporate and make good use of FSR experience.

False Assumptions

Some researchers claim that FSR causes an automatic dispersal of technologies (e.g., Simmonds, 1985). This assumption implies there is no room for extension in FSR, because researcher-farmer partnership in problem identification, in technology design and especially in on-farm trials creates an extension effect per se.

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This assumption can be questioned, from its starting point in that it omits the contribution of extension in technology generation and evaluation processes. Secondly, the claim of automatic dispersal doesn't have a strong basis in reality when taking account of experiences in the recent past from developing countries. Farmers in developing countries cannot be considered yet as businessmen who actively seek information. Substantial yield differences are evident between farms in the same agro-ecologic area and with similar resource endowment. There is always a need for extension programs to disseminate even very sound technologies to small farmers in developing countries.

Thirdly, the automatic dispersal assumption omits the "speed" of dispersion. Technologies may be dispersed automatically, but this will be over a long time period. A main function of extension is to shorten the time lag between technology generation and its widespread application in farmers' fields.

Last, but not least, even if it is accepted that FSR technologies disperse automatically among cooperative farmers, their relatives and friends, and even all farmers in the research site; is this sufficient to justify the project cost? FSR is an expensive research tool, and only can be justified if the proven technologies is adopted by most of the farmers within a wider recommendation domain. If today FSR has been facing rising criticism it is because its impact on actual farm production and farmers' welfare has been much smaller than the expected. Extension workers can help to ensure wider and speedier dissemination.

Institutionalization

In most cases the integration of extension workers into FSR projects has not succeeded even if genuine attempts were made. The reason was the lack of institutional arrangements. Extension workers have been occasionally asked to participate on the basis of individual initiatives. This appeal from FSR is not attractive to extension workers. It may have been perceived as an extra burden which could cause neglect of their own duties. The permanent and well-defined position of researchers vis-a-vis the temporary addition of extensionists is a potential source of conflict. Lack of institutional linkage arrangements also means the lack of clear professional rewards for extension workers.

The active participation of extension workers in FSR can be effectively accomplished only with defined institutional arrangements. These arrangements should provide the individual extension worker with professional incentives and rewards, and should ensure he obtains his share of the credit for the research and technology transfer effort.

Training of Extension Workers

A further impediment to extension workers' involvement in FSR is their low level of training. On one hand inadequate training may create a reluctance on the extension side to participate in FSR because of the lack of self confidence. Whereas, on the other hand this may create reluctance in research to invite extension workers to make a contribution to the FSR effort because of their lack of confidence in the ability of extension workers to perform scientific duties.

FSR requires well-trained extension workers and extension workers' training needs to be in the context of FSR. This includes: (a) Rural sociology, (b) farm management economics, (c) experimental design and layout, (d) data tabulation and analytical techniques, and (e) an orientation training course on FSR perspectives and methodologies, prior to joining FSR teams.

An Inadequate Emphasis

The introduction of the training and visit (T&V) system of agricultural extension has coincided with the emergence of FSR. The T&V system was created by the World Bank and, after testing in Turkey and India, has become its blueprint for extension. It has since been adopted by a large number of National Agricultural Extension systems.

The T&V system offers to conventional extension, new principles, operational guidelines and even precise formulae mostly derived from management science. Notable key features are; regular and continuous in-service training for field extension workers, visits to contact farmers in a fixed schedule, discharge from all non-extension related tasks, regular workshops for research-extension interactions (Benor and Baxter, 1984).

It is recognizable that the T&V system is not ignorant of linkages with research. It includes in its blueprint; SMS (subject matter specialist) teams as the main participants and the monthly workshops as the main venue for linking with research. However, it gives inadequate emphasis to adaptive research. While the T&V system has very detailed formats and time schedules for visiting farmers, training extension workers and all kinds of meetings, it has not suggested similar operational procedures for adaptive research. Moreover, description of farming systems, diagnosing farmers' problems and identification of recommendation domains are concepts and activities which are alien to both the methodology and practice of the T&V system.

Since the T&V system and FSR has been in existence together for more than a decade, and since FSR represents the best available alternative to strengthening the technology support base of extension services, it is surprising that so little attention has been given to the FSR experience by the T&V system. If the T&V system were to incorporate FSR teams as their technological support units, they would gain a much stronger research basis than the current practice of using SMS teams in establishing linkages with research.

Afterword

While FSR has made valuable contributions in the perspective and methods of agricultural research for resource-poor farmers, its impact on actual production and productivity of farmers has been relatively limited. This result, at least partly, is because the active participation of extension workers in FSR has not been achieved. There is a need for better recognition of the extension workers' role and contributions to FSR, for institutional arrangements to ensure the active participation of both research and extension and for training of extension workers to ensure full benefit from their involvement. Similarly, extension services should recognize in the future that FSR teams can provide them relevant and proven technologies more effectively than traditional research methodologies.

FOOTNOTES

1 Chambers and Jiggings, (1987), mention that other factors such as environmental, political, social and methodological, also contribute to the failure of conventional research in providing technologies suitable to the needs and conditions of small farmers.

2 The information obtained in the descriptive/diagnostic stage can be also helpful in making policy decisions for improving conditions such as input availability, credit and marketing and to accelerate technological and agricultural change. However, a recent evaluation study reveals that "impact on agricultural policy is one area where FSR programs have not fulfilled their potential" (Frankenberger et al., 1989). In fact, there is a farming systems approach designed exclusively for infrastructural and policy support (Fresco, 1984). The output of FSIP is information and its clients are policy makers and managers of agri-services.

3 The "recommendation domain" approach represents a compromise between research for a single farm condition and for the heterogeneous conditions of the country as a whole (Collinson, 1982). The former is costly, whereas the latter is unable to produce appropriate technologies. The premise, for the compromise of the recommendation domain, is that farmers working under same natural environment and operating a similar system, have similar problems and similar opportunities for improvement.

4 Secondary data collection is also very important in the descriptive and diagnostic stage. An effective secondary data collection and analysis prior to informal and formal surveys prevents unnecessary or overlapping data collection from these surveys.

5 It is not only a problem of the availability of a large number of researchers and/or their relatively higher salaries. As Evenson (1986) points out, the ratio of research cost to extension cost is 20 to 1 in low income developing countries (this ratio is 3 to 1 in developing countries). Therefore, if it will be possible, without compromising quality, to make use of extension workers in on-farm trials by saving "researcher time" will be a cheaper solution. Researcher time is an expensive input, thus, should only be utilized optimally.

6 The reason for farmers to emphasize the new technology treatments may be merely to please the researcher in order to maintain a continuing relationship. It may be perceived as an opportunity to gain higher status among their peer community members and more importantly to obtain further free inputs by holding the privileged position of being a "cooperative farmer". In contrast, according to Hildebrand and Poey (1985), farmers usually know how to produce more then they do produce and sometimes want to prove this the researchers. Therefore, more management emphasis may be given to the check plot than their normal practices on the farm. However, the same authors have stated that sometimes farmers don't touch the check plot until researchers give instructions on what to do, because it is perceived as a part of researchers trial. In this case the check plot cannot represent the farmers' real practice in the field.

7 Referring to a pair of concepts in communication science, homophily and heterophily (Rogers, 1983), it can be stated that the smaller the social distance between individuals the greater the likelihood that communication will occur and can be effective. Therefore, both a researcher and a farmer may prefer to communicate with an extension worker rather than with each other and can do it more effectively because of homophylic factors.

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