THE RELATIONSHIP BETWEEN FARMING SYSTEMS RESEARCH AND TECHNICAL COMPONENT RESEARCH WITHIN NATIONAL RESEARCH ORGANIZATIONS - EXPERIENCES FROM ZAMBIA

INTRODUCTION

The issue of institutionalizing farming systems research (FSR), and particularly of the relationship between FSR and technical component research, has been a neglected area of discussion. This paper discusses some of the problems involved in building close relationships between FSR and technical scientists working within national research organizations. It is contended that for either programme to be effective both must be mutually supportive. However, in order to achieve this, some fundamental changes are required in, amongst other things, the training of agricultural scientists and the management of research organizations. Discussion focusses both at a general level and on the experience with FSR in Zambia.

THE IMPORTANCE OF GOOD COOPERATION FOR TECHNOLOGY GENERATION

The importance of having effective working relationships between technical and FSR scientists is becoming more apparent (Rohrbach, 1980) because in several countries, including Zambia, problems have arisen in implementing FSR programmes on account of ineffective relationships with technical scientists.

There are two principal reasons why close cooperation between technical and FSR scientists is important. First to ensure that the "body of knowledge" of relevant technical solutions to small farmers problems is expanded as quickly as possible. Second, to

ensure that FSR programmes can be institutionalized within national research organizations in such a way that they can operate effectively and harmoniously with technical component research programmes.

Within the process of technology generation a distinction has been drawn between technical/applied research on the one hand and adaptive/"down stream" FSR, on the other. Technical research aims to solve technical problems and is conducted at research stations, organized along disciplinary and commodity lines. Technical research includes "up stream" FSR which seeks to generate prototype solutions to the major constraints on agricultural improvement in a relatively large region or area e.g. semi-arid tropics (Norman, 1980).

Technical research provides the "body of knowledge", stock of technical solutions, which adaptive research selects and tests as partially or whole solutions to a particular problem that has been identified as a priority by a target group of farmers (Collinson, 1982).

In the literature on FSR it is generally understood that FSR is not intended to replace basic and applied research (Gilbert et al, 1980). Instead it is expected that the two types of research should complement one another, with FSR drawing on the "body of knowledge" and of older disciplinary oriented scientists when designing technical solutions to identified systems problems. On the other hand, FSR scientists are supposed to channel unsolved technical problems to technical scientists, thereby improving the

relevance of the "body of knowledge" available for adaptive research (Collinson, ibid).

PROBLEMS ENCOUNTERED WITH TECHNICAL - FSR PROGRAMME LINKAGES

In spite of there being important reasons for technical and FSR scientists to cooperate closely there is evidence, from studies of FSR programmes which have been implemented, that cooperation to date has been limited. Heinemann and Biggs (1985) have recently highlighted the whole issue of FSR/E programmes ignoring their institutional environment and running into difficulties. They cite three references to FSR programmes which have faced "institutional problems" and state that two factors have usually been blamed. First, the bureaucratic structure of the research institutions which works against problem-solving, interdisciplinary research, and discourages feedback from lower levels. Second, the attitude of some research scientists, especially those in high ranking positions. One of the obstacles to institutionalizing FSR discussed by Gilbert et al (1980) is the fact that many scientists in disciplinary and commodity research programmes are reluctant to change due to their limited understanding and mixed feelings about FSR (pp66-67). In Zambia, although the Adaptive Research Planning Team (ARPT) has been institutionalized, nevertheless, commodity research scientists remain suspicious of the programme and only a modest level of cooperation between the two groups has been achieved. As part of this problem, ARPT has experienced difficulties because the "body of knowledge" of appropriate technical solutions, has been rather

small. On account of this ARPT has had to either work on lower priority problems or conduct technical research itself, thereby creating some ill feeling amongst commodity scientists, which in turn has frustrated the process of institutionalizing ARPT within the Research Branch.

REASONS FOR THE LOW LEVEL OF INTERACTION

The next part of the paper discusses some of the reasons for poor interaction between technical and FSR scientists generally, and then examines the experience in Zambia. The first point to make is that there has been little discussion of the question of relationships between FSR and technical research within the literature on FSR. It is treated only cursorily, which gives the impression that it is neither very important nor difficult to accomplish. Especially, when technical research is given the label "up-stream" FSR, there is an implicit assumption that it is closely related to the needs of a specific target group of farmers. Heinmann and Biggs (1985) consider that whilst there has been much discussion of FSR in theoretical terms, and "the methods" necessary to develop FSR programmes, there has been insufficient attention given to the institutionalization of FSR activities within national research programmes..."how they might best be planned so that they effectively strengthen and link up with the existing 'informal' and 'formal' research activities and become fully incorporated into the research and extension structure". (p.59)

One of the most important opportunities for considering the question of linkages between technical and adaptive research occurs when a country is deciding on the most appropriate organizational structure for institutionalizing an FSR programme within its existing research organization. There could be many possible arrangements to consider, including the creation of separate FSR section or placement of adaptive research scientists within multidisciplinary commodity teams or, again, location scientists from all disciplines together to work on the problems of a region. These decisions have a major part to play in determining the level of cooperation between different scientists. However, as will be seen later, when looking at Zambia's experience, there are many other factors which have to be considered which may outweigh the issue of cooperation (Kean and Chibasa, 1982).

The second reason for the low level of cooperation is that in spite of warnings that FSR should not be seen as a panacea (Gilbert et al, 1980), it has sometimes been promoted and adopted by donors and international research centres as if it could solve many of the technological problems of smallholder agriculture. As a result technical scientists have not been consulted as much as they should and in addition they have tended to receive less attention and financial support.

Heinemann and Biggs (1985) consider it ironical that FSR is tending to be packaged and distributed with an "attitude of 'we-know-what-is-best-for-you'", while the philosophy of FSR is

client centered, emphasizing the small farmer credit group. It might have been expected, therefore, that FSR programmes should also have been more sensitive to the needs of another important client group: national research organizations.

The third reason for limited cooperation between FSR and commodity research programmes is that FSR programmes do not give high priority within their goals and objectives to such cooperation. FSR programme objectives tend to give high priority to quantifiable outputs and low priority to developing close cooperation with commodity research scientists. These objectives are important because they are used to evaluate the performance of individual scientists and project impact. Even when a project document does include cooperation as a specific objective only half hearted attempts are made to evaluate whether in fact good cooperation has been achieved. This concern with quantifiable outputs reflects the tendency for project evaluation, especially by donors, to focus more on input-output issues than on project processes (Hopkins, 1985).

If the FSR project does not place high priority on developing effective cooperation with commodity research programmes it is unlikely that the individual scientists, within the FSR project, will themselves make the necessary effort, spontaneously. Experience from Zambia's ARPT has shown that FSR scientists tend to be concerned first with their individual disciplinary work programmes (i.e. agronomy or economics), second with their teams multidisciplinary work programme, and only third with the overall

output of the Research Branch, in which ARPT is one section, together with sixteen commodity and specialist research teams. Since individual scientists are likely to be concerned with their career prospects and their reputation within their discipline the FSR project should give high priority to the objective of team members developing close cooperation with technical scientists. An interesting question, related to the evaluation of individual scientists, is how to assess the relative contribution made towards the development of a successful technology by technical as compared with FSR scientists i.e, how should the credit be shared between them?

EXPERIENCES FROM ZAMBIA - COOPERATION BETWEEN THE ADAPTIVE RESEARCH PLANNING TEAM AND THE COMMODITY AND SPECIALIST RESEARCH TEAMS

Organizational options considered for institutionalizing FSR in Zambia

The Adaptive Research Planning Team (ARPT) was established in 1980 to conduct FSR within the Research Branch of the Department of Agriculture. It is worthwhile examining the different organizational options which were considered when incorporating FSR into the Research Branch because this provided an important opportunity to establish a good working relationship with the Commodity and Specialist Research Teams (CSRTs). The process of institutionalizing FSR within the Research Branch involved

incorporating two components; the placement of social scientists and the conducting of on-farm experiments.

The first option considered, would have been to undertake a very major reorganization of the Research Branch and establish regional research stations or institutes, which contained scientists from all disciplines and which would have been capable of focussing on agricultural enterprises and problems in a particular ecological zone. This option would have enabled the closest relationship between technical and adaptive research scientists as they would have shared a common objective of solving regional problems. However, this option was never a real possibility because it was at variance with the already agreed policy of establishing multidisciplinary Commodity and Specialist Research Teams (CSRTs) which had responsibility for working on different crops, livestock and other activities for the country as a whole (the complete list of CSRTs is shown in Diagram 1). These CRTs have a mandate to serve all provinces and the different agroecological zones of Zambia, and are based at research stations in the most appropriate provinces.

The second option was to include the social scientists in each of the CSRTs, thereby making them truly multidisciplinary. However, the main problem with this option was that the social scientists would still not have a complete farming systems perspective if they were expected to focus only on problems related to the particular Commodity or Specialist Research Team in which they

were working. Furthermore, such an approach would have entailed each CSRT carrying out its own surveys and on-farm trials in, thus resulting in a massive duplication of effort, as well as bringing confusion to farmers as different CSRTs could have been working in the same area. Additionally, the approach would have relied on all scientists being motivated to work with small scale farmers as well as appreciating the role of social scientists and being prepared to conduct on-farm experiments. There was indeed a high probability that the social scientists, newly graduated and with limited experience of their profession, would be isolated either by not being clearly understood or by not having their role fully appreciated by other team members.

The third option recognized that the CSRTs have a national commodity focus, whereas FSR has an area focus. Thus two separate but complementary approaches would be most appropriate. In addition it was recognized that adaptive on-farm research requires different organization and management from technical research conducted at research stations, which would be better handled by a separate team. That as a new team, with methodology only tested to a limited extent in Zambia and with virtually no skilled manpower to draw upon to conduct FSR, it would be important to build up a closely knit team committed to the approach, which could critically appraise itself and help to develop appropriate methodology. Therefore it was decided to opt for this more radical approach of setting up a separate team with its own national coordinator supporting nine provincial teams.

That this option was adopted is a clear indication of the high level of commitment by policy makers to the concept of FSR and it has been this commitment which has lead to ARPT to be now working in seven out of Zambia's nine provinces. The new structure of the Research Branch is illustrated in Diagram 1.

Developing Linkages Between ARPT and the CSRTs

It was realized that by choosing the option of a separate unit to conduct FSR, it would be necessary to give priority to developing effective cooperation between the two types of research teams. Good cooperation between ARPT and CSRTs is important for the following reasons:

1. ARPT staff need the opinions and advice of specialists in the CSRTs when conducting informal surveys and designing formal questionnaires, in order that critical observations about farmers' agronomic problems can be recorded.

2. When on-farm trials are being designed by ARPT it is essential that the existing "body of knowledge" generated by CSRT scientists is made available so that effective screening of technical solutions and designing of on-farm experiments can be undertaken.

3. When extension recommendations are formulated both APRT and CSRT scientists need to exchange ideas to ensure that the best advice is given to farmers.

4. Information collected by ARPT on farmers' circumstances (agronomic, socio-economic and institutional) can be used to help CSRT research in three ways:

(a) By identifying technical problems, requiring further applied research, such information can help to plan CSRT research programmes including screening of appropriate experimental treatments.

(b) Information on farmers' preferences for particular varietal characteristics can be included as criteria within breeding programmes.

(c) Certain CSRTs, with extension activities, can benefit from information collected about farmers' reactions to particular technologies e.g. improved grain storage technology being tested by the Food Conservation and Storage Unit.

It was initially assumed that this two-way flow of information would take place spontaneously. Although this has happened to some extent it has been necessary to high-light particular opportunities for cooperation and to create others, as well as to develop specific formats for the exchange of data. These attempts to formalize points of cooperation between ARPT and the CSRTs can be listed according to the ARPT sequence of activities:

i) Participation by CSRT scientists during informal surveys conducted by ARPT.

ii) Assistance by CSRT scientists in formulating formal survey questionnaires.

iii) Establishment of pre-research committee meetings/annual

commodity review meetings to exchange information and formulate both adaptive and on-farm technical research programmes, including the criteria for inclusion breeding programmes.

iv) Exchange of details of experimental programmes between APRT and CSRT scientists to enable detailed comments to be made on the treatments in both adaptive and technical experiments.

v) Visits by CSRT scientists to ARPT on-farm research.

vi) Meetings to discuss the release of research recommendations organized by the National Research Extension Liaison Officer.

vii) To facilitate the exchange of information from ARPT scientists formats for the following data have been developed:

a) Quantified agronomic data summary sheets:

b) Project outlines for each experiment which emphasize the hypotheses behind each trial and the criteria against which the results will be assessed.

c) A format for presenting information about identified problems to CSRT scientists at the pre-research committee meetings.

d) Crop/variety profiles prepared by CSRT which explain the management implications of new crops or varieties which may not yet be found in any farming systems. These can help during the process of screening technical solutions.

e) A revised format for germ plasm collection which includes information about the reasons for farmer preferences.

The formalizing of linkages has been necessary following a decision that 60% of CSRT work should eventually be answering

problems of small scale farmers identified by ARPT (Kean and Chibasa, 1982). Cooperation between ARPT and CSRT scientists have taken place but it has taken place more at the initiative of individual scientists than because of a general recognition of the need for inter-team cooperation. The fact that only a modest level of cooperation has so far been achieved means that the benefits of the two-way flow of information have only been achieved to a limited extent and that it has been difficult to harmonize ARPT scientists with CSRT scientists and thereby achieve effective institutionalization.

Reasons for achieving only a modest level of ARPT - CSRT interaction.

Several reasons have been given by both ARPT and CSRT scientists for the modest level of cooperation between the two groups.

1. There are several criticisms which have been made by CSRT scientists to express some skepticism or hostility about the work of ARPT.

(a) APRT has been accused of doing technical research which should be done by CSRT scientists. This has arisen because the "body of knowledge" for some crops is very limited owing to the low level of resources allocated to some CSRTs in the past and present. The problem is compounded by the fact that access to previous research results has been difficult, especially at regional research stations. As a result the ARPT staff have had to decide whether to either work on lower priority problems or to

do some of technical research themselves in conjunction with any CSRT scientists that have resources. The problem has been exacerbated by the fact that some CSRTs have only plant breeders (in certain cases several breeders) but no agronomists and it is the latter who should in fact be doing the technical research which ARPT scientists can then use for on-farm adaptive testing.

(b) Related to the last point is the criticism that ARPT scientists are repeating work which has been done before. This is partly due to the fact that access to previous research findings is in some cases extremely difficult but is also due to the fact the biological relationships, which hold under a research station environment, may not still hold when tested under farmers circumstances and hence the need to apparently repeat previous trials on farms.

(c) Scientists with the CSRTs are sometimes critical of the experimental designs, methods and apparent poor quality of work of adaptive research scientists. There have been cases of poor research management of on-farm trials and the results of this work has not been accepted. Such scientists find it difficult to accept that on-farm trials will often look different from experiments conducted at research stations because of variation in non-experimental variables, under farmer management. Scientists trained and experienced in experimental methods suited to research station conditions will need to be convinced of the

validity of using different methods when conducting experiments together with farmers.

(d) CSRT scientists see that ARPT has received considerable support in terms of manpower and resources and this has inevitably created some ill feeling.

(e) Certain CSRT scientists consider that some ARPT scientists have acted unilaterally, without consulting them about issues such as trial design and recommendation release. This criticism is not unique to ARPT but nonetheless, being a new organization, such behavior helps to create the impression that ARPT sees itself as a panacea.

(f) The concept and understanding of the contribution that FSR can make to the technology generation process is still not fully appreciated by CSRT scientists. As a general comment, there is still a tendency for many scientists to consider that if only the small scale farmers could be given credit and necessary resources by the government, they will then be able to adopt the same technology as large scale commercial farmers. In other words, it would be better if farmers could change their circumstances to fit the technology available rather than designing technology to fit farmers' circumstances.

An interesting point is that many of the above criticisms of ARPT concern the agronomic and experimental side of the programme rather than the socio-economic side.

2. It has already been mentioned that some CSRTs have been allocated only limited resources, both of manpower and finance. However, distances in Zambia are considerable thus very often the CSRTs simply do not have the resources to participate in the activities in ARPTs programme. The communications system are also very poor and arranging for CSRT scientists to participate in ARPT activities can be extremely difficult.

3. There has been quite rapid turnover of scientists in the Research Branch, both Gambian and expatriate, and this has resulted in research programmes being discontinued and has hindered the building of a "body of knowledge".

4. Within the various project documents for ARPT, drawn up by donors and Zambian authorities, the objective of ARPT-CSRT cooperation has been given only low priority. Furthermore, the job descriptions for APRT and CSRT scientists rarely mention that cooperation is an important issue. Yet it is these project objectives and job descriptions which will be used as criteria for judging both the scientists and the project impact during project evaluations.

5. As mentioned earlier in the paper a problem with the ARPT scientists is their disciplinary identity. They tend to be concerned first and foremost about their individual disciplinary work programme because they are concerned to maintain their identity with their discipline especially to ensure their career enhancement. Thereafter, ARPT staff identify with their role

within a provincial ARPT and only after that is the overall output of the Research Branch considered an important objective. Thus, cooperation with CSRT scientists is not likely to be spontaneously a matter of high priority for ARPT scientists.

6. One important reason for the disciplinary identity is the emphasis given to disciplinary excellence during training at university. Recognition and promotion is usually on the basis of disciplinary excellence not on the level of interdisciplinary cooperation. Thus both the training system and the reward system do little to encourage Zambian or expatriate scientists to place high priority on cooperation with other scientists.

Suggestions for improving the level of ARPT-CSRT cooperation

It is gradually being recognized by scientists within ARPT that ARPT can only complement the existing CSRT activities. In particular, it is recognized that without strong CSRTs there will be not messages to test in on-farm trials - a point which has been felt most strongly already by ARPT on issues related to farm machinery and tillage, for which there is no CSRT. Thus it is being recognized that ARPT and the CSRTs need to be mutually supportive. The starting point is to recognize that these institutional issues are important. The question is whether research management can accept responsibility for considering the problems presented in this paper and work towards solving them.

1. The first suggestion is for ARPT scientists to actively campaign for strong CSRTs to ensure that they have the manpower and resources to provide a high quality "body of knowledge" as well as to be able participate in ARPT's activities. Such a situation will do away with the need for ARPT to conduct technical research itself and would remove resentment that "ARPT is getting all the resources".

2. There is need to establish an effective data base and a system for recording all research results, preferably using a microcomputer system. Initially a bibliographic exercise and cardex system will improve the system.

3. The Research Branch and donors alike need to give higher priority to developing closer cooperation between ARPT and CSRT as a specific objective of the many different projects which are undertaken by both ARPT and CSRTs. In addition to including this within the project objectives, it should be included in job descriptions of individual scientists. Projects and scientists should then be evaluated against this criterion.

4. An annual experiential management training workshop would be extremely valuable for all scientists, however long they have been in the Research Branch. In such a workshop it would be possible to discuss the contribution that FSR can make and why research methods may need to be different in on-farm experiments as well as a range of other issues which may be worrying either ARPT or CSRT scientists and thereby reducing their readiness to

cooperate. In an informal environment it should be possible to resolve various differences and remove misunderstandings by providing people with an opportunity to meet one another. A related team is that, as part of the orientation of new scientists, especially expatriates, training should be given on the importance of ARPT/CSRT cooperation and multidisciplinary cooperation in general.

5. As part of the final year training in the School of Agriculture at the University of Zambia it is intended to introduce a course on interdisciplinary cooperation which should help to breakdown the traditional disciplinary barriers which are the root cause of much of the problem. It is hoped to link this course with several undergraduate research projects in a farming system close to the university, in conjunction with ARPT scientists.

6. The formal occasions for ARPT - CSRT interaction need to be emphasised by research management as important occasions for cooperation. The support of senior research managers is crucial in this regard.

7. Information supplied by ARPT and CSRT should be available in a form that is relevant to the needs of CSRT scientists.

8. Attempts should be made to incorporate effort towards ARPT-CSRT cooperation as part of the reward system for scientists

recently proposed (Ministry of Agriculture and Water Development, 1985).

CONCLUSIONS

It is now being recognized that it is very important to have the full cooperation of FSR and technical scientists in the technology generation process. However, achievements to this end have so far been rather limited largely because the whole question of institutionalization of FSR programmes within existing research organizations has been given little attention. From Zambia's experience it can be seen that two tiers of research can be in operation with only minimal cooperation between them. If the situation was to remain as it is neither programme, ARPT or CSRT, could cooperate effectively. However, with increasing recognition that both programmes must be mutually supportive and with the implementation of certain specific suggestions to improve cooperation, it is expected that a more harmonious relationship will develop.

****

References

Collinson, M.P. (1982) Farming Systems research in Eastern Africa: The experience of CIMMYT and some National Agricultural Research Services, 1976-81, International Development paper No.3, Department of Agricultural Economics, Michigan State University.

Gilbert, E.H., Norman, D.W. and Winch, F.E. (1980) Farming Systems Research: A critical Appraisal, Rural Development Paper No. 6, Development of Agriculture Economics, Michigan State University.

Heinemann, E. and Biggs, S.D. (1985) "Farming Systems Research: An Evolutionary Approach to Implementation", Journal of Agricultural Economics, 36: 59-65.

Hopkins, T.J. (1985) "Methods and Models of Evaluation", in R. Clarke and P. Freund (eds), Guidelines on Project Evaluation in Zambia. Lusaka: University workshop on Project Evaluation. University of Zambia.

Kean, S.A. and Chibasa, W.M. (1982) "Institutionalizing Farming Systems Research in Zambia", Farming Systems Newsletter No. 8, Nairobi.

Government of Zambia, (1985) Zambia Strategy for Agricultural Research. Ministry of Agriculture and Water Development, Lusaka.

Norman, W.D., (1980) The Farming Systems Approach: Relevancy for the Small Farmer, Rural Development Paper No. 5, Department of Agricultural Economics, Michigan State University.

Rohrbach, D.Dd, (1980) (Draft) "A discussion of Issues Relevant to the Development and Implementation of a Farming Systems Research Program"