PDBBT113

TANZANIA INDUSTRIAL STUDIES AND CONSULTING ORGANISATION
P.O. Box 2650, DAR ES SALAAM TANZANIA
Office: IPS Building, Samora Avenue
Cable: 'TISCO DAR ES SALAAM"
Tel: 31421-3, 32981-3
Telex: 41182
Telefax: 255-51-30420

IMPACT EVALUATION

OF

TANZANIA FARMING SYSTEMS RESEARCH PROJECT

A STUDY FOR

UNITED STATES OF AMERICA AGENCY FOR INTERNATIONAL DEVELOPMENT

U.S.A.I.D. FSR - PROJECT NO. 621-0156

1989-10-10 ISIC No. 000 Project No. 89 - 072

TABLE OF CONTENTS

LIST OF APPENDICES

ABBREVIATIONS AND DEFINITIONS

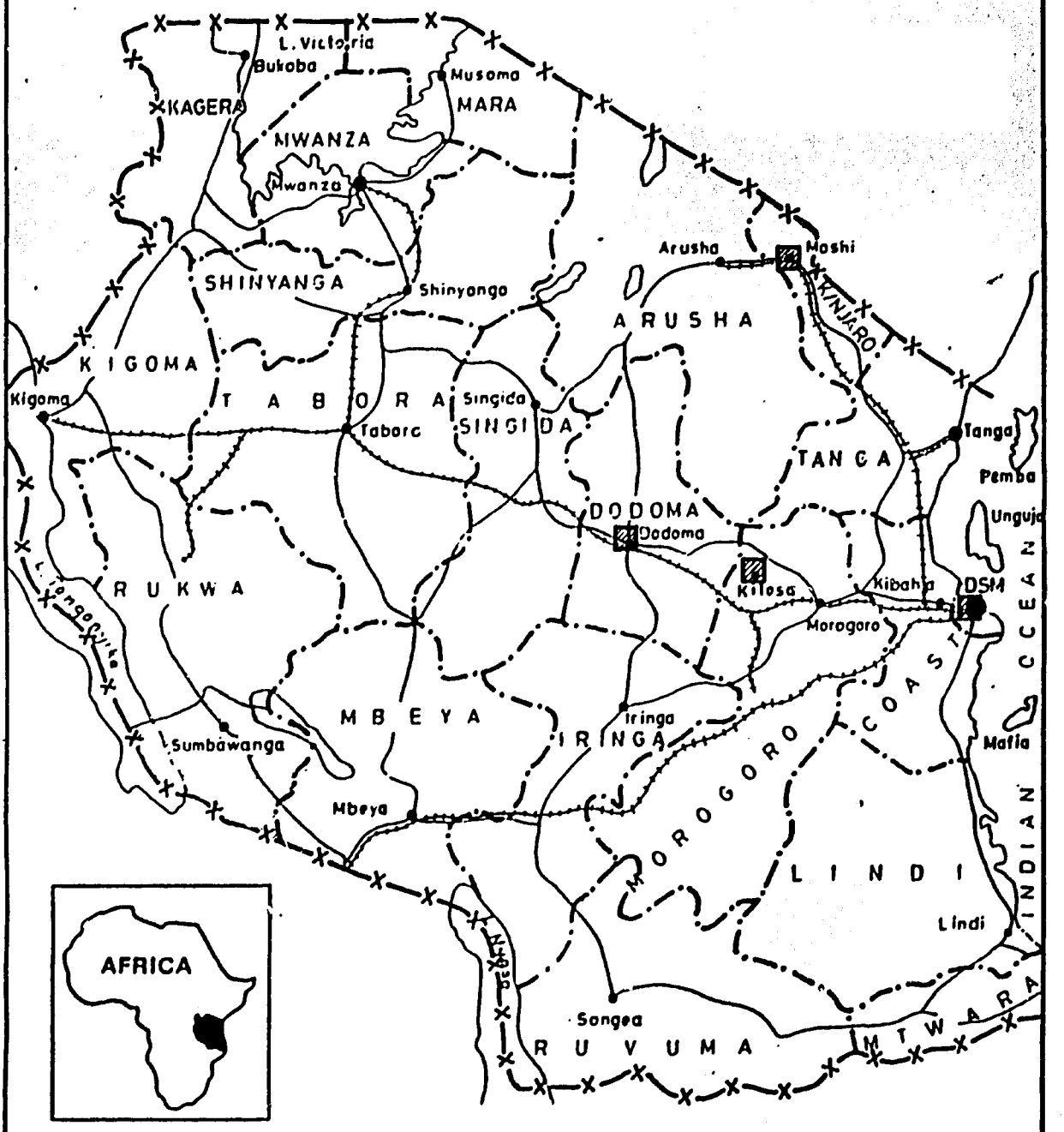
ARI	Agricultural Research Institute
CID	Consortium for International Development (Association of American Universities).
CIMMYT	International Centre for Maize and Wheat Improvement
CoP	Chief of Party
CSU	Colorado State University
DADO	District Agricultural Development Officer
FAO	Food and Agriculture Organisation
FSR/E	Farming Systems Research and Extension Team.
FSR	Farming Systems Research
GoT	Government of Tanzania
ICRISAT	International Crop Research Insitute for the Semi Arid Tropics
IITA	International Institute for Tropical Agriculture
MALD	Ministry of Agriculture and Livestock Development
MOA	Ministry of Agriculture
NCDP	National Coconut Development Programme
OSU	Oregon State University
RADO	Regional Agricultural Development Officer
REDSO/ESA	Regional Economic Development Support/Office for East and Southern Africa

SUA	Sokoine University of Agriculture
TALIRO	Tanzania Livestock Research Organisation
TANSEED	Tanzania Seed Company.
TARO	Tanzania Agricultural Research Organisation
TISCO	Tanzania Industrial Studies and Consulting Organisation.
TPRI	Tropical Pesticide Research Institute
TRD	Training for Rural Development
TMV-1	Tanzania Maize Variety - 1
ICW	Ilonga Composite White Maize Variety
T&V	Training and Visit System
UNDP	United Nations Development Programme.
USAID/AID	U.S. Agency for International Development.
USD	United States of America Dollar
TShs	Tanzania Shillings
cm	Centimetre
ha	Hectare
MT	Metric Ton
%	Percent
Masika	Swahili word for main rainy season lasting from February through May
Vuli	Swahili word for the short rainy season lasting from November through January

MAP OF TANZANIA

AREAS WHICH WERE INVOLVED IN THE FSR PROJECT

1982 - 1986



LEGEND

- International Boundary
- Regional Boundary
- Roads
- Railway Lines
- Regional Headquarters
- FSR Project Area

ACKNOWLEDGEMENT

TISCO acknowledges with thanks the assistance rendered by various individuals, groups and organisations which was very useful towards the completion of this report in the short period allowed for the study. Our thanks go to the following persons/institutions.

Dr. G.H. Semuguruka	- Commissioner for Research and Training - MALD
Dr. F.A. Shao	- Assistant Commissioner for Research MALD
Mrs. Z. Semgalawe	- Acting Assistant Commissioner FSR - MALD
Mrs. V.F. Malima	- Senior Research Officer - MALD
Mr. S. Muro	- Assistant Commissioner for Crop Production - MALD
Ms. T. Ramadhani	- Information Officer - MALD (Research and Training Division)
Mr. L. Kessy	- Station Director - Lyamungu
Mr. S. Lyimo	- FSR Co-ordinator - Northern Zone
Mrs. L. Mushi	- Field Officer FSR - Lyamungu
Mr. P. Matowo	- Maize Agronomist - Lyamungu
Mr. A. S. Mosha	- Zonal Director - Ilonga
Dr. A.J. Moshi	- Maize Co-ordinator - Ilonga
Mr. J.K. Mligo	- Legume Co-ordinator - Ilonga
Mr. M.E. Mvungi	- Rice Agronomist - Ilonga
Mr. A. Suutazi	- Sorghum Pathologist - Ilonga
Ms. Mshana	- Breeder/Agronomist-Cotton -Ilonga
Mr. J. Mamkwe	- Field Officer FSR - Ilonga
Mr. B. Makwaia	- Principal MATI - Ilonga
RADO	- Kilimanjaro Region

RADO	- Morogoro Region
Dr. I. Lupanga	- Associate Dean, Faculty of Agriculture - SUA
Dr. A.N. Minjas	- Head, Crop Science and Production Department - SUA.

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

This report analyses facts gathered to evaluate the impact of the USAID funded Farming Systems Research Project (No. 0621-0156) which was implemented in the years 1983 to 1986. The project, which was implemented on a pilot basis, was co-ordinated by Ilonga Research Institute and Lyamungu Research Institute in the central and northern zones respectively. The former covered the districts of Kilosa and Dodoma and the latter Moshi district (Moshi Rural and Hai).

The main objectives of the project were:

1) to test a new approach to agricultural research aimed at integrating smallholder circumstances into the development of technology in order to increase food production,

2) to develop and equip a research institution - TARO that would have capacity to plan, implement and sustain agricultural research in the country,

3) to support food crop research through station and land development at Ilonga and offer technical support to national food grain crop research.

The project was executed by a contract with OSU/CID through TARO and its impact has been evaluated on the basis of facts gathered in Kilosa and Moshi to assess whether:

- the farmers in the pilot areas are now better off,
- interaction between commodity research and FSR/E linkage has been achieved,
- on-farm testing was achieved and sustained, and
- TARO has been strengthened.

In gathering facts for the impact evaluation, farmers, planners, extension staff, researchers and FSR team members were interviewed and past reports were analysed.

1.2 MAIN FINDINGS

The contract for the project was signed in 1982 but the project took off in 1983. The project was funded by both the USAID and the Government of Tanzania.

AID contributed USD 3.0 million for the provision of technical personnel, machinery and equipment, training for local staff and project operation. The Government of Tanzania provided, in Tanzania Shillings, the equivalent of USD 4.549 million to support TARO and towards buildings construction and land development at Ilonga.

The implementation of the project in Kilosa and Moshi covered 12 and 5 villages respectively. In Kilosa 120 farmers were initially selected, but only about 48 participated in on-farm trials; the rest carried out uncontrolled trials. In Moshi, initially 20 farmers were envisaged but later the number was reduced to 16.

Trials were addressed to farmers' constraints and priorities as identified during the surveys that preceded the trials. On-farm trials were mainly managed by the farmer.

There has been a positive response to most of the technology packages tested on farms and feedback from the farms has had some influence on the commodity research activities. Notably in Kilosa, farmers have adopted an early maturing (90-day) maize variety, Kito, which had already been produced by research at Ilonga but was not yet known to the farmer. The variety has solved the endemic famine in Kilosa which occurred at the onset of the masika season.

In Moshi, the practice of intercropping maize at optimal density with Lyamungu-85 beans has gained acceptance among farmers in the intermediate altitude area.

Generally, the farmers are interested in the activities of FSR. The teams are now more known at village level than the conventional extension staff.

The project also contributed significantly to the development of 19 research buildings at Ilonga, although these are rarely used because of lack of water, laboratory equipment and furniture. Land development, on the other hand, was only implemented to less than 50% of target.

The project managed to establish one full FSR/E team at Ilonga and partial teams at Lyamungu and Dodoma (Hombolo) as opposed to 3 full teams envisaged at the beginning.

1.3 CONSTRAINTS

In the course of implementation of the project, various constraints affected the project, the main ones being:

i) funding,

ii) weak TARO management and technical advisors/counterpart interaction,

iii) transport,

iv) short project period, and

v) limited acceptance of the FSR methodology by commodity researchers and extensionists.

The Brooke Amendment which caused revision of the original project funding affected the morale of the project implementers. In spite of the revised scope of the assignment, the main objectives and goals remained the same. This explains the delays in the project execution and the subsequent difficulties in fulfilling the project obligations in the limited time provided for implementation.

TARO, the main executing agent of the project, initially had weak management which contributed to some of the failures of the project.

Inadequacy of transport facilities was another major problem. Most of the available vehicles and earth moving equipment were second-hand and lacked essential spare parts. As a result, they were frequently unservisable.

Penetration of the FSR approach was also plagued by the little acceptance of FSR feedback by commodity researchers and the passive role of the extensionists.

1.4 CONCLUSION

FSR has shown to be an effective way of transferring the benefits of research technology to farmers. The FSR approach has been tested in the two ecological zones centred at Lyamungu in Moshi and Ilonga in Kilosa. The success achieved in these zones has been officially adopted in the MALD structure and plans are underway to expand it to more ecological zones in Tanzania. Though the FSR project recognised the major role of women in agricultural production, it never took cognizance of their constraints/priorities.

In spite of the achievements noted above there were also some shortcomings, mainly as a result of low funding, inadequate planning and poor management. These problems were compounded by the short time span allowed for project implementation.

2. INTRODUCTION

2.1 REPORT LAYOUT

This report is organised into 4 chapters. The first chapter is the executive summary, in which the main findings of the study are presented. Chapter 2 is the introduction which gives details of project background and salient features of project design and implementation plan. The main subject of impact evaluation is discussed in chapter three while the last chapter presents conclusions.

2.2 BACKGROUND

2.2.1 General

For more than a decade (1971 to 1983), USAID funded the Agricultural Research Project (No. 0621-0107) which was implemented with technical assistance from IITA, ICRISAT and CIMMYT. During this period, a considerable amount of work was done in uplifting research capability in terms of human resources development and laying a strong base for commodity research, particularly on food crops. The centre of operation for this project was Ilonga Agricultural Research Institute.

The experience gained through the implementation of this project was that much research work had been done in developing new technology packages, but little was done to transfer these to the farmer. Hence, the need to expedite the process of dissemination of research results to the farmer resulted in the formulation of the FSR project by USAID.

In 1982 the Governments of Tanzania and the United States of America signed a Grant Agreement for a Farming Systems Research Project (No. 0621-0156). The original grant stood at USD 8.3 million for a four year period, but this was later revised to USD 3.0 million for a three and half year period as a result of the Brooke Amendment . The Brooke Amendment was a result of changes in USA foreign policy during the period 1982-84 which called for aid restriction to countries which had defaulted on previous USA loan repayments.

The actual funding commitments according to revised project documents indicate that out of AID's contribution of USD 3.0 million, USD 2.225 million was for a contract with CID/OSU to provide technical assistance and training for the project. The remaining USD 0.775 million was AID/Tanzania budget for the project to cover imports of machinery/equipment for land/station development, travelling, project contracts and administration.

Another source of funds for the project was GoT contribution in Tanzania Shillings of the equivalent of USD 4.549 million. These funds were to come from PL 480 fund and MALD recurrent budget for research and TARO. The PL 480 funds were mostly directed towards construction and land development activities.

The project started being implemented in 1983 and was completed in 1986. Its purpose was to develop and sustain a new approach to agricultural research. Furthermore, the project aimed at institutionalising research and integrating the FSR approach into existing research programmes. The approach was to place emphasis on smallholders as the nucleus for agricultural development and sustainability. Implementation of the FSR project was to focus on 18,000 farmers in 15 districts, but later it was revised to cover only two agro-ecological zones served by Ilonga and Lyamungu Research Institutes. The pilot project concentrated on Kilosa, Moshi and Dodoma districts. Included in the project was the construction of buildings and development of infrastructure and the enhancement of research capacity for the country.

2.2.2 The Farming Systems Research Concept

Farming Systems Research methodology or approach to agricultural research and development is a three stage process. Firstly, it identifies farmers' priorities and constraints in production for a given locality. Secondly, these priorities and constraints are used to improve the technology packages developed by commodity researchers (on-station research) and thirdly, the resulting packages are experimented on the farmers' plots (on-farm research). Testing on farmers' plots facilitates demonstration of the technology and therefore gives the farmers the chance to evaluate it before adoption.

The FSR approach is resource-based and multi-disciplinary in nature. It employs both natural and social scientists in tackling farmers' problems. The approach is considered to be quick in disseminating research information to farmers. It is a bottom-up approach of technology generation as it studies farmer circumstances first before determining solutions to problems. This is in contrast to the approach which develops technologies and then passes them to the farmer through extension agents. Apart from being a long process, the latter approach is in most cases incapable of responding to farmers' problems as technologies developed are not specific to ecological zones and farmer circumstances.

The Tanzania FSR project was conceived to test, among other things, this bottom-up approach to research in agriculture. It employed the techniques developed by CIMMYT which include:

- farm surveys,
- diagnostic experiments,
- on-farm trials,
- evaluation, and
- dissemination.

2.2.3 Design and Implementation Plan

The main goal of the project was to increase food production through strengthening of interaction among commodity researchers, extension workers and the farmer. This was expected to be accomplished by increasing the number of on-farm trials with more farmer participation. The project focused on strengthening the ability to produce and sustain new technology packages, which included improved seed varieties, cultural practices and associated cropping and product management services.

The major components of the project were therefore:

1) to employ and test the effectiveness of an FSR approach to disseminate research results to farmers,

2) to continue support to food crop research as a means of ensuring development of technology to feed FSR,

3) to institutionalize a body to manage research, thus establishing a co-ordinating unit to sustain the aforesaid.

Achievements envisaged at the end of the project were:

1) establishing a Farming Systems Research approach that would be used in food crop research, initially in the pilot areas of Kilosa, Dodoma and Moshi districts and later on extended to other districts of the Republic,

2) developing a strong TARO with a headquarters well equipped and staffed to play the key role of planning, co-ordinating and managing agricultural research,

3) forging strong linkages between the strengthened TARO and other Tanzania Government agencies involved in agricultural research and production. In doing so, FSR would be institutionalised to form a coordinating network from the implementing FSR team at station and village levels up to the national level. This would ensure stronger interaction between commodity research, extension and the farmer,

4) expanding of food crop research. To this end emphasis was to be placed on continuing research on the three main staple grains namely, maize, sorghum and millet and also on legumes. The research programmes were to address themselves to farmer constraints and priorities in the low, medium and high altitude areas,

5) training 5 scientists to M.Sc. level to take charge of FSR and exposing several others to short courses and on-job training with a view to familiarizing them with the new approach. It was also envisaged that there would be a comprehensive training management plan within TARO,

6) facilitating the creation of a capacity to publish research and other information and establishing a sustainable system of information dissemination. Documentation of policy issues would be achieved and dissemination channels to policy makers created,

7) developing Ilonga station in terms of research facilities, land infrastructure including irrigation facilities and 19 buildings for offices, laboratories and crop handling and storage.

Specific details on the objectives and planned outputs of the FSR project are listed in Appendix 2:A

The project was initially to have had Colorado State University (CSU) as principal contractor. However it was Oregon State University (OSU) that was awarded the contract, and the American Universities Consortium for International Development (CID) coordinated the project.

The collaborative assistance contract with OSU/CID was signed on March 1, 1983 but the long-term experts arrived in the country in October 1983, about 8 months later than originally planned. Earlier on, an advance team of experts had started work on a diagnostic survey and various activities had already been undertaken in the country, including a 5-day FSR workshop held in October 1983.

Other activities which had been undertaken included architectural and engineering designs for the station buildings and land development. A procurement contract for imported materials had been signed and construction agreements concluded.

Monitoring of the implementation of the project was to be provided by USAID, TARO and CID/OSU. Day to day operations were to be undertaken by TARO and CID/OSU contractors. The former was to provide full time counterparts to the contractors' experts.

2.2.4 Project Evaluation

In March 1986 when the project was nearing completion, an evaluation of the project was done by an independent consultant.

The evaluation report indicated the following achievements:

(i) using FSR, major constraints to agricultural productivity were identified and solutions determined, farmer-tested and disseminated,

(ii) groundwork for integrating farmers, extension workers and commodity research personnel was laid down to effectively spearhead the development, promotion and dissemination of technology,

(iii) a number of publications, mainly by Tanzanian authors, were produced and distributed.

Another project evaluation report was prepared by REDSO/ESA in October, 1986.

The outputs of the project were listed as follows:

- a national food crop and adaptive research programme had been established to be sustained by TARO,

- a strong human resource base had been developed for continuing food crops and adaptive food crop research,

- about 500 farmers in 3 districts were using new technology packages for maize, sorghum and legumes; a methodology for using FSR technology and dissemination strategy had been employed in two pilot zones,

- one team was fully staffed and trained to teach colleagues FSR methods and two teams were partially staffed and trained.

Three years after the termination of the project, USAID requested an assessment of the impact the FSR project had made on the pilot areas in particular and on the nation in general. USAID commissioned TISCO to undertake this impact evaluation study. The scope of work embodied in the TISCO proposal is presented in Appendix 2:B. The major study objectives are:

a) to determine whether the farmers in the pilot districts (Kilosa and Moshi) are now more productive than they were before the FSR project was introduced to them,

b) to identify the actual implementers/ participants and those who benefited from the project,

c) to determine whether on-farm testing was achieved and sustained under FSR principles, and

d) to determine whether the institutionalisation of research has been achieved and sustained.

2.3 METHODOLOGY

TISCO's methodology for carrying out the study involved studying published project documents and conducting interviews and discussions with USAID, MALD headquarters staff, research personnel at Lyamungu and Ilonga ARI and, specifically, team members of FSR activities, a sample of farmers in the two pilot project districts and lecturers/library staff at Sokoine University of Agriculture (SUA).

The choice of individuals to be interviewed was made by the consultants on the basis of information sought, based on a semi-structured guiding questionnaire, which is given as Appendix 2:C. Farmers interviewed were picked randomly from the group which was involved in the project, with a deliberate bias on women farmers.

3. PROJECT ACHIEVEMENTS AND CONSTRAINTS/PROBLEMS

3.1 THE FSR METHODOLOGY

3.1.1 General

In order to evaluate the effectiveness of the FSR methodology as it was implemented, a review is made of the extent to which FSR was tailored to:

- farmers' constraints,
- the commodity research/FSR/extension and farmer linkage,
- the farmers' awareness, adoption and repeated adoption of technology transfer by FSR,
- its own acceptance by the various participants in the FSR project, including the farmers.

The FSR carried out diagnostic surveys to identify farmers' production problems and opportunities, identified solutions and tested and evaluated these solutions before recommending the technology to farmers for adoption. The application of CIMMYT FSR techniques for two seasons in Kilosa district and once in Moshi district (the second is still going on in Moshi) is itself a significant achievement. It reflects a departure from the traditional approach to agricultural research where a "top-down approach" is used to generate and transfer technology while the farmer and extension service remain passive in the whole process. In this case it is the basic researcher who knows the technology which is best, and the farmer and extension personnel are expected to take it without questions. This approach has been hampering agricultural production in developing countries including Tanzania. The pilot FSR project which managed to complete two cycles in Kilosa within 3½ years, helped to make the farmer the focus of technology - the beginning and end of technology.

Nevertheless, a review of the survey report by the project team on both Kilosa and Moshi districts and the TISCO survey and observations reveal that the FSR solutions adopted were not a complete package because the livestock sector and off-farm activities were not included. These weaknesses in the FSR project contributed to the modest impact it has made.

What is quite significant, however, is the high percentage of farmers who have consistently adopted improved crop husbandry; many farmers now plant in rows, straight lines,

pure stand or relays as recommended by FSR. The impact of FSR in this respect is not in any way small.

The consultants feel, however, that the time within which the FSR project was implemented was too short to allow for FSR to have had a significant impact on technology adoption. The fact still remains that FSR needs to be implemented over a longer period with close monitoring and evaluation before one can make any conclusive evaluation of FSR impact on technology generation. transfer,and adoption.

3.1.2 The Commodity Research/FSR/Extension and Farmer Linkage

The success and sustainability of the FSR approach to technology generation and transfer depend on how commodity research and FSR are integrated and linked on the one hand and the extent to which FSR is linked with extension and the farmer on the other.

While the FSR management was well aware of the need to involve researchers, extensionists and the farmer in FSR activities, it has yet to fully create a strong and sustainable linkage between FSR and researchers on the one hand and extensionist on the other. Most of the commodity researchers accept, in principle, the FSR concept but are not yet fully convinced of its superiority to other approaches to research. The top-down approach to research and technology transfer still remains in their minds. A lot of training and their increased involvement in FSR are needed in order to help them change their attitudes towards the FSR approach.

While the extension personnel were involved in identifying contact farmers, conducting diagnostic surveys and, in some instances, managing the on-farm trials and the DADO's/RADO's support the FSR concept, the integration of extension workers into FSR is still very weak. The weakness partly emanates from the low morale of extension workers due to lack of incentives and proper working gear.

The present reorganization of extension services, the adoption of the T & V system approach to extension and the implied investment in extension may enhance the linkage between extension and FSR.

The weak FSR/extension linkage reveals a "gap" in technology transfer and its sustainability in Kilosa where the FSR methodology was tested and evaluated for two seasons. The explicit "gap" is in the lack of post- FSR demonstrations run and managed by extension workers to help farmers who did not adopt the technologies during the FSR period to do so and those who did so to improve and sustain the technologies already adopted. The presence of such demonstrations is very important to sustain the

achievements of the FSR project. The so-called "demonstrating farmers" actually do not use their farms for demonstration but rather what they do is to produce seeds for other farmers to use. In fact the location of such farms which are normally not easily accessible and are distant from conspicuous institutions like schools, and their sub-optimal management leaves much to be desired regarding their use as demonstration farms and as sources of "pure seeds" for other farmers. While the latter is an alternative way of trying to solve input problems, it is still not an appropriate way of producing seeds. This is so because of the low crop husbandry and management practices of these farmers and their inadequate knowledge of the post-harvest handling and storage of seeds. Indeed, there are also greater chances of having cross-pollination as these seed farms are among farms with other seed varieties. Hence the production of pure and good seed for farmers is not assured. The FSR field officers do not have enough time, and transport problems hamper close supervision of such demonstration farmers.

The limited integration of extension into FSR is frustrating extensive adoption of technology and may in future be a constraint to the sustainability of FSR achievements.

The involvement of both women and men farmers in FSR and organization of seminars and farmers' field days at Ilonga and Lyamungu are commendable achievements of FSR. However, there is a need to look at the farmers' system as a whole and to involve the livestock sector and off-farm activities.

3.1.3 The Awareness, Adoption and Repeated Adoption of Technology

The effectiveness of the FSR methodology is also reflected in the extent to which the farmers are aware of it, its technological solutions and the number of farmers adopting the technology either in the first round or in repetition. Although the consultants did not have adequate time to carry out an extensive survey to that effect, much can be deduced from Appendix 3:A. All the farmers interviewed were aware of the FSR project and the technologies being popularised by FSR. All contact farmers had partially or fully adopted the technological solutions to their problems. The partial adoption of Kito maize (early maturing), Tegemeo sorghum and cowpeas is attributable to other factors which call for more attention in research. For instance, the small cob size and lack of resistance to pests for Kito maize variety and the small seed size for cowpeas need to be investigated by the commodity researchers so as to improve the technology and make it compatible with farmers' requirements. Furthermore, the

solution to the problems of vermin and inadequate availability of seeds which minimize the adoption of the Kito and other seed varieties lie in the collective efforts of Tanseed, Cooperatives and MALD's plant protection section.

The repeated adoption of the technology by smallholders reflects the importance of Kito maize in reducing the February/March famine stress which has been plaguing Kilosa district for a long time. Kito is now regarded as "Mkombozi"(i.e. saviour) among farmers. One reason why the involvement of large farmers in the technology - Kito and cowpeas - is still unsatisfactory is because their interest is not so much in solving food problems as in getting some commercial returns from their crops. The small size of maize cobs and grains, the undesirable colour of cowpeas and the difficulties associated with storing these crops are some of the problems which have to be solved before the technologies may consistently be adopted by farmers.

The survey of the project area and Appendices 3:B and 3:C reveal that FSR involved women in the on-farm trials. Nevertheless, the involvement of women was small compared to that of men. The FSR staff explained that at first the involvement of women was high but decreased later when some of them withdrew from the on-farm trials because they did not own land and husbands were not interested in their participation. Some were stopped and replaced by other contact farmers because they had failed to manage the on-farm trials as required by the FSR project, apparently because of having priorities other than the FSR packages. However, Appendix3:C indicates that many socio-cultural factors do favour the man rather than the woman in participating in on-farm trials. The sociol-cultural factors may also explain the low repeated adoption rates for women (Appendix 3:B). These socio-cultural factors may therefore frustrate women who would have liked to take advantage of FSR technology transfer. This militates against the sustainability of FSR achievements.

3.1.4 The Feasibility of the FSR Methodology in and Beyond Kilosa, Dodoma and Moshi Districts (Pilot Project Area)

The applicability of FSR methodology in and beyond the pilot project area depends on finding solutions to the problems which constrained the implementation of the FSR project.

These problems were:

(i) inadequate funding,

(ii) limited time for the implementation of FSR activities,

(iii) inadequate transport,

(iv) inadequate co-ordination among relevant institutions, and

(v) inadequate acceptance of the FSR methodology by researchers and extensionists.

3.1.5 The Effect of FSR Project on GoT Agricultural Policies

The FSR project has had some effect on the GoT agricultural policies, specifically in the following areas:

(i) the project assisted in implementing and translating into practice the country's agricultural research policy on adaptive research,

(ii) the GoT accepted the FSR approach to agricultural research and institutionalised it under MALD,

(iii) the project contributed to the training of researchers and farmers, though to a limited extent.

The GoT agricultural policy of 1983 stated clearly the importance of having an agricultural research policy that takes a farm-centred problem-solving approach for on-farm testing to arrive at relevant technology packages for the farmer. The policy directs that agricultural research should focus on farmer problems in different agro-ecological zones and adopt a farming systems approach. The implementation of the FSR project speeded up the implementation of the agricultural research policy on adaptive research. The FSR project demonstrated and publicized the underlying concepts and has helped the GoT to understand the meaning of farming systems research and how it could be applied in a given ecological zone to enhance agricultural production.

Indeed, experience gained on FSR has encouraged the GoT to institutionalize the approach into its MALD structure. Its functional structure will be in 7 zones to cover the whole country - (see section 3.4.4). In fact other foreign donors are already funding and running similar projects in different zones of the country. For example, in the Lake zone and the southern highlands the projects are centred at Ukiriguru near Mwanza and Uyole near Mbeya respectively. This move by GoT is very much in line with its agricultural policy, which calls for closer interaction between the smallholders, agricultural researchers and the extension workers so that the activities of research are tailored to the farmers' needs.

3.2 THE DEVELOPMENT AND IMPROVEMENT OF TECHNOLOGY

One of the objectives of the FSR project was to develop and improve technology to be adopted by the farmers to increase food production. The FSR project was quite lucky in that the technology needed to solve the serious problem of February/March famine in Kilosa already existed at the Ilonga Agricultural Research Institute.

A survey had indicated that farmers needed early maturing maize seed varieties to plant during the short rains to solve the February/March problem. The long maturing maize varieties like Staha did not do well during the short rainy season and most farmers were not growing maize in the long rainy season because they devoted most of their time on commercial crops such as rice and cotton. The Kito maize variety was early maturing and had been released. Yet it was still confined to the research station and farmers did not know about it. For the same reasons farmers were not aware of the early maturing cowpeas and improved beans and sorghum.

The FSR project took the technologies and started various on-farm trials in different locations of Kilosa and Moshi districts (see Appendix 3:D for trial details). The contact farmers soon found out that Kito maize was appropriate for them in the short rains to solve food problems; and so was the cowpeas variety.

The FSR project also managed to influence the farmers to change their crop husbandry methods as they presently plant in rows and straight lines. However, they still resist using the recommended spacing of 90 cm by 60 cm. Instead they use 90 cm by 75 cm between plants and rows respectively, claiming that the latter helps them to relay cotton with maize more easily. The FSR trials proved that there is no significant difference in yield when the farmers do not follow the recommended plant spacing. It should, however, be recognized that such conclusions based on observations taken over the short time span of the FSR project and the limited number of on-farm trials carried out are not necessarily correct. Yield increases are determined by many factors, including seed varieties, plant population densities, type of soil, amount of moisture, management of crop enterprises and even the on-farm trials. These trials should be continued at least at the research stations, for a long period if the conclusions arrived at are to be convincing and objective.

Nonetheless, there is no doubt that the availability of Kito maize seed and improved crop husbandry practices have benefited the farmers. Besides getting an early crop in the short rainy season, the farmers can now have two or

three crops of maize by planting either Staha or TMV-1 seed varieties during the long rainy season. The TMV-1 seed variety is an improved medium maturing maize seed with resistance to maize streak virus. It does well in the late rains of the long rainy season and is also planted in valleys to benefit from the off-season residual moisture. The fact that TMV-1 can be planted late in the long rains allows the farmer to distribute his labour effectively during the farming period, thus promoting the possibility of having an addition crop of maize. Thanks to the Ilonga breeders, the TMV-1 maize seed variety was also available to the FSR team when they began their field work.

The impact of the FSR project on the development and improvement of technology can therefore be related to two aspects only:

(i) the transfer of the useful technology from research stations to solve farmers' food problems, and

(ii) the influence the FSR had in orientating research programmes to adaptive research (either on-station or on-farm trials) both in the project area and elsewhere in the country.

The FSR project made significant achievements in the transfer of technology from research to farmers. This achievement, however, was possible because the technology existed. It would have taken a long time to either improve on existing technologies or adapt imported technology, and longer still if the technology was to be developed from scratch.

The response of researchers to develop/adapt technology based on FSR feedback from the farmers is still minimal. A review of the research programmes in 1988/89 does not convince the consultants that much has been done in this respect.

Objectives of research programmes still emphasize yield increases and very little emphasis is placed on adapting the technologies to farmers situations to solve their problems. Besides, most of the programmes are still conducted on-station; very few are adaptive research projects. For instance, out of the 8 sorghum/millet programmes going on, only one can be registered as adaptive research and off-station (the Pearl Millet Agronomy).

In the case of maize, only 8 projects out of 30 can be regarded as adaptive research projects. The same trend applies to rice and legume programmes.

It is important to note that most of the adaptive research projects have been planned and developed without the

influence and involvement of FSR. The trials are generally not on farmers' plots but in public places like schools and are managed by commodity researchers.

However, there has been a notable influence of FSR on some legume projects, in particular the cowpeas projects. The legume programme responded to FSR feedback on cowpeas - the farmers did not like the small sized cowpea. In response, the legume programme developed large sized cowpeas. Although the farmers still do not like the colour of the large sized cowpeas, it is still a commendable response from commodity researchers.

Despite the above positive influence of FSR on the legume programme, the influence of FSR on other research programmes and researchers in general is very little. For example, there is a need for research projects on sorghum to improve the stalk of Tegemeo sorghum which farmers like for food but still prefer the local varieties because of their "tall stalk" which is used for thatching, etc. The maize programme should have started to adjust its activities to develop or improve Kito maize to be resistant to pests. There is also lack of replicated FSR on-station trials either managed by commodity researchers or in collaboration with the FSR team. The absence of such on-station trials is also a weakness in the commodity research/FSR linkage and reflects the little influence FSR is having on the commodity research programmes.

3.3 TRAINING AND HUMAN RESOURCE BASE

3.3.1 Personnel Development

To effectively carry out the tasks of the project, training of staff was of prime importance. The training was to be given to the core FSR team members and others who were associated with the project such as commodity researchers, extension personnel and the farmers.

As per project requirement, three core FSR teams were to be developed, one for each district. The teams were supposed to be composed of social scientists, natural scientists and extension personnel.

The project envisaged to train 5 M.Sc. level scientists and several others would be given short courses and on-the- job training on FSR approach.

Those given M.Sc. level training under FSR project funding included:

Mr. Nick Lyimo	-	Plant Breeding
Mr. Emil Mmbaga	-	Agronomy

Mr. Clemence Mushi	-	Agronomy
Ms. Anatolia Mpunami	-	Plant Protection

All these have returned but none of them is working for FSR. However, all are working for MALD food research programmes, except for Ms Mpunami who is working with the NCDP.

Others who received postgraduate training under the co-odination of the project but funded by TRD or other sources included:

Ms. Evelyne Chota	-	Agricultural Economics
Ms. Zainab S. Mbaga (Mrs. Semgalawe)	-	" "
Mr. Otto Ringia	-	" "
Mr. Kija Bunyecha	-	" "
Mr. Juma Kitundu	-	Entomology
Mr. Nurdin Katuli	-	Agricultural Engineering

Indeed some of these were to have been trained through FSR funding, but the cutting down on project budget as a result of Brooke Amendment forced the project to solicit funding from other sources to enable trainees to complete their studies. Of these only Mrs. Semgalawe and Mr. Otto Ringia are working for FSR. The rest are either on further studies, working under other MALD research programmes or have moved to other institutions. Apart from the degree courses offered to the 10 participants, short courses were also organized for them at OSU and in Tanzania (on FSR methodology). The FSR team also benefited from two local in-service short courses which were organized with the assistance of CIMMYT - Nairobi.

Other staff who benefited from the short and in-service FSR courses and worked for the FSR project are:

<u>Ilonga</u>

Mr. A. Mwanjali	-	Zonal Agronomist & Co-ordinator
Mr. W. Sumari	-	Zonal Economist
Mrs. L. Mushi	-	Field Officer (Trials) (now at Lyamungu)
Mr. F. Nkamu	-	Field Officer (Trials)

Mr. J. Mamkwe	-	" " "
Mr. S. Mndolwa	-	" " "
Mr. A. Chillagane	-	Agricultural Engineer/District Co-ordinator

Hombolo (Dodoma)

Mr. O. Kitundu	-	Field Officer (Trials)

Lyamungu

Mr. T. Samki	-	Zonal Economist
Mr. V. Akulumuka	-	Zonal Agronomist
Mr. D. Mallya	-	Field Officer (Trials)
Mr. S. Swai	-	Field Officer (Trials)

All these are still involved in FSR activities or other food research programmes except for Mr. Samki who has left the Ministry.

The foregoing account of personnel who were trained under the FSR project and the fact that FSR activities are still going on show that the project managed to impart knowledge of FSR methodology. Indeed it managed to fully staff the Ilonga zone team and partly staff the Dodoma (Hombolo) and Lyamungu teams as shown above.

Moverover, in a way the FSR project also involved the commodity researchers working on food crops research in the pilot zones. All those who were interviewed at Lyamungu and Ilonga had some knowledge of what the project was about.

Accordingly, the project laid down a human resource base capable of furthering the FSR approach, as the trained personnel were able to train others who are now working on FSR activities.

A point worth noting is that FSR team members are sometimes used as resource persons to teach farmers who enroll at Ilonga Training Institute to receive training in agricultural practices. This is in recognition of their knowledge on researcher/extensionist/farmer interaction.

3.3.2 FSR Publications

A number of publications (100 plus) were produced by the project in the form of reports and technical papers. However, these remain on the shelf as they are seldom used by the FSR teams or commodity researchers. This was deduced from interviews which indicated that most people were not aware of the presence of the reports. A few academics/scientists could have used them for reference purposes.

The project initiated another publication, the TARO Newsletter. Had this been circulated more liberally, it could have possibly provided a better way of reporting on project activities and the FSR approach. What is significant, however, is that the TARO Newsletter endured and efforts are underway to convert it into a Research and Training Newsletter to reflect the present reorganization in the Ministry.

3.4 MANAGEMENT/CO-ORDINATION SYSTEM TO SUSTAIN NATIONAL FOOD CROP AND ADAPTIVE RESEARCH

3.4.1 Introduction

The Farming Systems Research project had a provision for technical assistance to TARO for the establishment of an organization/management/co-ordination system in order to improve its planning, budgeting, co-ordination and management ability. This institution building programme was to include:

(a) the development of national research programmes for maize, sorghum/millet and legumes,

(b) the development of a system to coordinate research programmes and national research plans that accord with national strategies and priorities,

(c) the development of a budgeting policy that allocates financial resources to research priorities,

(d) the development of management guidelines for TARO for training key management personnel,

(e) the development of a system to monitor and evaluate research activities and the utilization of financial resources,

(f) the establishment of linkages between TARO and other organizations serving smallholders, and

(g) the integration of the FSR approach into the existing commodity agricultural research.

The subsequent revised project documents (e.g. Project Paper Supplement of February 1984) did not change these objectives. In the final analysis, the project was to help TARO establish a headquarters and to improve its management through increased staffing, better planning, improved budgeting, co-ordination and implementation of research.

The above objectives which the FSR project intended to achieve by institutional strengthening of TARO can be looked at from:

(i) the extent to which the technical advisors carried out their work (performance),

(ii) the integration of the counterpart staff in that work (both operational and planning procedures) so that they could take over the work left by technical advisors once the project was completed,

(iii) the ability of TARO to adopt the expertise and management tools to continually improve agricultural research planning and management,

(iv) the co-ordination of research programmes and/or linkage of TARO to other organisations,

(v) the overall management ability of TARO headquarters to plan and manage agricultural research, and

(vi) the institutionalization of FSR methodology.

3.4.2 The Performance of Technical Advisors (OSU/CID)

It appears that the technical advisors at TARO headquarters were well aware of their duties. The performance of the technical advisors is related to the following major achievements recorded at the end of the project (1986):

(i) development of a long term programme for research and its budget implications for TARO FSR section,

(ii) a study on the guidelines for improved financial and research management and record keeping,

(iii) preparation of proposals for improved financial and research management and record keeping,

(iv) preparation of proposals for the development of an improved system for the publication of research results in Tanzania, and

(v) establishment of linkages with other Government of Tanzania institutions serving agriculture through organising and attending various workshops and conferences.

However, there has been little sustained use of the above achievements. This may be explained as follows:

(i) the contractor (OSU/CID) was unable to develop a comprehensive national agricultural plan with clear and concrete objectives and priorities. There was little involvement and co-ordination of other research organizations in the development of the long-term research plans. Besides, the short and long-term plans for TARO had little to do with what actually was happening in the various TARO ARIs because the researchers at the research stations were not adequately involved in planning and budgeting. Furthermore, the apparent inadequate interaction between technical advisors (OSU/CID) with researchers at the research stations and inadequate involvement of technical advisors in the field in planning agricultural research frustrated the development of national agricultural research priorities for use by research co-ordinators and administrators to adapt research programmes to financial and manpower resources,

(ii) counterpart staff were not fully involved in technical advisors' activities. This was responsible for limited interaction between counterpart staff and technical advisors and prevented adequate on-the-job training. (This may also explain the limited use and sustainability of the technical advisors' achievements by TARO at the end of project). The little involvement of counterpart staff may be explained by:

(a) late appointment and allocation of counterparts to the contractor (OSU/CID) by MALD/TARO,

(b) limited interaction of technical advisors with TARO researchers. The technical advisors were working from offices away from TARO or MALD headquarters and in isolation from the national research co-ordinators. The counterpart staff for field technical advisors, for instance maize and sorghum/millet specialists, were at Ilonga research station. The continued stay in Dar es Salaam of those technical advisors who should have quickly moved to their duty station at Ilonga reduced their interaction with

national research co-ordinators and their counterpart staff at Ilonga. This lack of interaction was responsible for the apparent lack of interest on the part of counterpart staff and TARO in most of technical advisors' activities.

(iii) the contractor was unable to translate the proposals for financial control, management and record keeping into operational formats or systems to facilitate financial management and record keeping in TARO. The proposals were not used for financial management. The lack of financial control and management led to frequent late payment of TARO staff salaries, suspension of some research projects and, finally, to the dismissal of TARO headquarters top management including its Director General in 1985.

(It is not known where the proposed plans and proposals for financial management and record keeping are presently kept and are therefore not being used to assist in resource allocation to research or for financial management and record keeping.)

(iv) The technical advisors were faced with the dilemma as to whether to put emphasis on long range activities or to give priority to short term activities which gave quick results upon which they could report. In this case, the short period which was available to implement the FSR project favoured the latter.

It is not surprising that the comprehensive agricultural research plan which called for extensive review of the agricultural sector, agricultural research in particular, and close co-ordination and involvement of other agricultural research organizations was not implemented. The consultants are also of the opinion that even the choice of strategy by the technical advisors to implement the FSR methodology was influenced by the limited time for the FSR project; emphasis was given to crops with practically no involvement of livestock or off-farm activities which affect the farmers' system. Effort was also made to look for existing technologies (crop varieties) to solve farmers problems in Kilosa rather than attempt to develop new ones - this was a commendable strategy. Hence, had Kito maize or TMV-1 maize varieties not existed at Ilonga research station, the FSR project would now be having little impact because the development of short maturing maize or importing and adapting varieties them would have taken a long time to transfer to the farmer.

3.4.3 The Ability of TARO to Plan and Manage Agricultural Research

The overall ability of TARO to plan and manage agricultural research was not adequate. This is explained by:

(i) inadequate staffing and training in TARO (many key positions in the management of TARO took long to be filled; for example the first director of research was appointed in the third quarter of 1985),

(ii) inadequate funding of TARO programmes,

(iii) weak management in the initial years of TARO which resulted into delayed decisions and poor fund disbursements,

(iv) the dismissal of most of the top TARO management in 1985 which worsened the situation, and

(v) inadequate technical support from the technical advisors to carry out effective on-the-job training for the counterpart staff.

3.4.4 The Institutionalization of FSR Methodology

The integration of the FSR approach into the existing commodity research was an important objective of the FSR project. The project required institutionalizing FSR in TARO. The FSR project success in Kilosa brought awareness among researchers and planners on the importance of FSR approach to technology transfer and is now being accepted as an important approach to agricultural research.

This is underlined by the fact that the FSR methodology has been institutionalised within the organisational structure of MALD's division of Research and Training. The FSR project co-ordinator in TARO continued to co-ordinate FSR activities after completion of the project in 1986. FSR research activities (on-farm trials) continued in Lyamungu zone (Northern zone) and FSR staff continued to consolidate the achievements of FSR in Kilosa district through starting on-farm trials focusing on variety evaluation, utilization of off-season moisture, input (seeds) distribution, etc. The National FSR Committee which was started by TARO to strengthen support for the FSR approach is, however, no longer operational.

The MALD is in the process of integrating the FSR methodology in its new structure (see Appendix 3:E). The FSR, like commodity research, is now organized on a zonal basis and 7 FSR zones will be set up. Five of these zones have already been established (Tumbi, Ukiriguru, Salien,

Ilonga and Uyole zones). Indeed, the Ilonga and Salien zones are a continuation of the FSR project.

3.5 DEVELOPMENT OF RESEARCH INFRASTRUCTURE

3.5.1 Land Development at Ilonga ARI

According to FSR plans, TARO was given the responsibility of implementing land development at Ilonga. Land development included levelling of all research plots and provision of irrigation facilities. The planned completion date for the projects was 1986, but to date the physical performance achieved is estimated at only 47%. At the end of the project in 1986 outstanding work included land levelling, roads and drainage, construction of the irrigation dam, installation of a pumping station, fencing, workshop supplies and irrigation systems. Except for the pumping station which is now installed, most of these works are not completed to date. Details of construction works remaining and the present condition of the machines and equipment are presented in Appendix 3:F.

About TShs. 11.0 million has been spent on land development out of which TShs.7.3 million was from PL480 funds and the remaining TShs.3.7 million was funds from GoT. About TShs.10.0 million in both local and foreign currencies, is needed for completing the remaining works. The estimated time for completion is about 21 months after the funds have been made available.

Looking at the implementation of the land development activities the consultants believe that TARO had given low priority to the project. Otherwise TARO would have been able to at least complete the construction works already started, including that of Lake Ilonga. The lake is still in its initial stages of construction and at present the progress is slow. It is unlikely to be completed in the near future.

Notwithstanding the above observations, the 54 ha of research land developed (out of 200 ha) has been quite useful in facilitating rapid experimentation by commodity researchers.

3.5.2 Station Development at Ilonga ARI

The FSR project also awarded a contract to a private contractor to construct 19 buildings at Ilonga.

These new buildings include:

2 Scientific workshops with facilities for short and long term storage of seeds

2 Scientific office blocks

1 Administrative office block

1 Farm office block

1 Farm machinery repair shop

2 Farm equipment and vehicle parking sheds

1 Powerhouse (including wood workshop)

1 Bulk storage warehouse with rooms for storing agro-chemicals

1 Bulk seed sorting shed

1 Workers' ablution block

2 Oil and gas storage rooms

1 Laboratory complex with 3 laboratories

1 Guard house

1 Loading ramp

1 Elevated water tank.

As the project was coming to an end in 1986 most of these physical structures were complete, with the exception of refrigeration in the seed stores which was completed later. The present condition of the buildings is satisfactory but usage is limited to one bulk storage warehouse which is being utilised for drying, sorting and storing of seeds. Some works were not included in the construction contract but are essential to enable the new facility to be used effectively. These include water supply to the buildings and proper fencing of the complex. Other essential facilities not supplied include laboratory equipment and furniture. The MALD has not provided any funds for the operation and maintenance of the buildings.

The estimated completion cost is TShs.6.0 million. Since it is not certain when funds will be made available for completion, it is difficult to determine how soon the new facility will come into use.

This facility would provide adequate office space for the scientists, storage of working equipment and research materials and handling, processing and long-term storage of seeds. All these are major constraints at the moment.

3.5.2 Vehicles, Office Furniture and Equipment

The project also provided basic office equipment and furniture mostly for the FSR headquarters office. Some were however, allocated to Ilonga and Lyamungu Agricultural Research Institutes. Although some of these equipment and furniture which include tables, chairs, cabinets, computers, cameras, soil testing kits, typewriters and bookshelves can be seen around, a number of them cannot be traced.

There were also some vehicles which the project used, but most of these are grounded and cannot be repaired for lack of funds and spare parts. In addition, there were motor cycles which were sold to FSR and extension team members.

Available details on these facilities are given as Appendix 3.F.

3.6 ROLE OF WOMEN IN FSR

Women in Tanzania are vital to agricultural development. It is a well known fact that women play a dominant role in smallholder agricultural production. They are responsible for planting, weeding, harvesting, threshing and drying activities. This is in addition to taking care of all the household chores like fetching firewood, drawing water, and preparing food for the family. The men mainly undertake land clearing and preparation, but very often they are also assisted by women. However, the proceeds from the sale of crops are normally controlled by men.

The FSR project recognized the importance of women in adopting technology packages and hence included them in on-farm trials. However, the methodology was not tailored towards making women its primary target. Indeed, it could not make direct contact with women without the consent of their husbands since in most cases the husband owns the land and agreement to conduct trials on the farm must come from him. The only women included in FSR were those who were heads of family either because they were widowed or their husbands were employed or doing business away from home.

Decision making for many of the farming activities or in accepting new technologies within the family was seen to be done through joint consultations. However, in the final analysis, the man being the head of the family had the final decision. So it is important to address the packages to the men while keeping in mind that the implementation will be done by the women.

Otherwise when issues are addressed to women only they are in most cases not taken seriously by the men, and often it becomes difficult to accept or implement them.

In the traditional farming system, men and women often have separate pieces of land for growing crops, although the man's plot is considered to be the family's and all members of the family are expected to work on it. Furthermore the division of labour in the household depends much on the type of crop to be grown. For instance in the project areas visited, where inter-cropping of say, maize or cotton with legumes (beans, cowpeas or green grams) was involved, the husband was only keen on maize and cotton while the wife cared for legumes but at the same time participated fully in the maize and cotton operations.

In cases where wives manage on-farm trials, financial assistance comes from the husbands especially for hiring labour and purchasing inputs. Women have been found to be keen and eager to adopt new technologies given to them, but sustenability of these technologies has generally been poor. Forty percent of the women visited in Moshi district managed the trial farms well and showed positive results, but these were initially assisted by their husbands. The main reason for women's poor participation in FSR trials, according to them, is that they have many activities to attend to both at home and at the farm and therefore find it difficult to pay much attention to the trials.

A woman member of the FSR team at Lyamungu ARI found it easier to work with women farmers than men even though women received second hand information from their husbands on new technologies. Women tended to be more attentive and participated fully in the farming operations. In addition the women were always near the homestead whenever contacted while it was difficult to find men at home unless information was passed to them before hand.

Though the involvement of many women in FSR implementation was not considered a priority in the project, from the above findings it is important to note that had their involvement been more vigorous, there could have been greater impact on the farmers in the pilot areas as women are primary end users of technologies.

Little effort has been directed by researchers and FSR teams in trying to understand farmers' social aspects in order to enable them to understand more clearly the causes and the nature of the problems they encounter. Factors like storability, seed size, milling qualities, palatability and aroma need to be taken into consideration in developing seed varieties.

For example on-farm rice variety evaluation trials done in Kilosa district involving Salama, Faa Mwanza, Kihogo Red and Super India showed that although super India is low yielding and highly vulnerable to bird attacks, it is preferred for its palatability and good aroma.

Moreover it is easy to cook. These qualities are primarily perceived by women and not by men who are only interested in the commercial aspects of the varieties.

From the above findings, it may be concluded that women have long involvement in agriculture and are the primary end-users of new technological packages. Hence FSR and commodity researchers must pay due attention to women participation in all aspects of agriculture.

3.7 STUDIES DONE

In the course of implementing the project, various issues were found to have effects on the project goals. Among those noted was the fact that women are the central point in the diffusion of agricultural technology at the farm level, being the main labour force for farming and household activities. This fact prompted a study carried out in 1985 by a woman research officer with MALD. The subject of the study was the 'Role of Women in Farming Systems.'

This investigation indicated that for agricultural research to be successful the role of women's activities on the farming system needed appreciation. It further underlined the need to comprehend their social and economic conditions which need to be considered if women are to be actively involved in development, from the farm to the national level.

In a nutshell, the study revealed that:

(1) women constitute 80%, 60% and 40% of the agricultural labour force in Africa, Asia and Latin America respectively,

(2) agriculture still remains women's main occupation in developing countries,

(3) extension and input supply services have done little in making women more productive as they have not fully focused on their needs,

(4) women lack training and have poor contact with extension workers, who are mainly men with whom they will seldom discuss their problems,

(5) women have benefited very little from new research technology in spite of the fact that they are the main end-users of research technology packages.

Although the FSR team was aware of these findings, they were yet to be incorporated in the project when it wound up in 1986. Indeed, the consultants found out that most of the women who were involved in the project's on-farm trials were either widows and therefore heads of their families or wives of workers, and therefore responsible for the entire farm-work. The preceding section has already elaborated on the involvement of women in FSR and development.

Another study which was conducted by a SUA member of staff 'Marketing of Farm and Non-Farm Products in Kilosa District', was a reconnaissance survey done in 1986. This study was carried out to gather more details on the farmers' system. Whereas the FSR project focused on the development and transfer of agricultural technology to farmers, it had paid little or no attention to the farmers' socio-economic environment, such as alternative economic opportunities available to him, the storage and marketing of his produce or other non-farm products and other social services such as transportation and the basic needs of shelter, water and good health.

The main findings of the study were that:

(1) notwithstanding the constraints in agricultural production, farmers in Kilosa district are able and competent,

(2) adequate fertile and arable land exists in Kilosa district but farmers' plots are limited in size due to labour constraints because the farmer has to apply his limited labour to other socio-economic activities, in addition to farming with the implied drudgery of using the handhoe,

(3) their small farms result in low crop production, leading to low surplus for sale to the markets and consequently low income and purchasing power,

(4) poor market management and storage and delayed payments for the produce sold affected farmers' operations adversely,

(5) there was little technology to promote other potential economic activities in the district such as fruits/vegetables handling, brick making, hand crafts and capentry.

The recommendations of the study were directed at solving the farmers' problems noted in the main findings above. These included:

(1) increasing the marketable surplus of food and cash crops in the district through the provision of economic incentives to the farmer and better technology through strong FSR/E and ensuring a workable input distribution system,

(2) improving the efficiency of the marketing system and instituting prompt payment for farmers' produce, as well as the provision of adequate transport and storage facilities,

(3) increasing farmers' chances of generating more income by promoting non-farm enterprises.

These recommendations were not taken into account during the project as the project was almost coming to an end when the study was done. In any case the use of improved technology could be seen in the project areas as already noted in the case of new seed varieties, husbandry practices - such as planting in lines and the use of fertilizers/insecticides and crop sequencing.

The questions of marketing and development of other non-farm products have not really been solved. For example, the problems of organised market storage and transportation are still with the farmer to-date.

3.8 IMPACT ON FOOD PRODUCTION AND FOOD SELF-SUFFICIENCY

3.8.1 Effect on Food Production in Kilosa District

The main objective of the FSR project was to increase food crop production. A review of the on-farm trials, the two - week consultants' interviews of the farmers and field observations show that there should have been substantial increases in crop production, particularly maize. Appendices 3:H and 3:I reveal that the farmer was able to grow two crops of maize through maize/maize relay cropping which was impossible before the FSR project. This enabled the farmer to increase his annual maize stock by 42 percent.

The annual maize production was raised from 1.33 tons/ha if the farmer grew maize only in vuli season to 2.29 tons/ha if he grew maize in both masika and vuli seasons (Appendix 3:I).

The increase in maize production emanates from the possibility of growing maize in the long rainy season. Originally the farmer did not grow maize in the long rainy season because this would introduce labour constraints to paddy and cotton growing as this season was reserved for these crops. Before the introduction of the Kito maize variety for the short rainy season, the farmer was growing either his local maize variety seeds or Staha (a main season variety) in the short season. Given the unreliable rainfall in vuli, Staha did not perform well and the farmer was left without enough food or none at all. His local varieties were also of no advantage because they are long maturing. However, the demonstration by the FSR project that maize/maize relay cropping is possible and the advantage of making it possible to reduce labour requirements has enticed farmers to grow more masika maize. Labour requirements are reduced in the sense that the farmer can either plant cotton or another crop of maize immediately after harvesting the short rains crop and therefore take advantage of a clean farm. This maize/maize relay cropping has another advantage of assuring the farmer that even if he missed or lost the vuli crop he would still plant the masika crop. The interviews with the farmers revealed that they are aware of these advantages and are making full use of them.

3.8.2 Impact on Food Self-Sufficiency

The previous section (3.8.1) explicitly indicates that at individual farmer level the existence of the early maturing Kito maize variety and the possibility of growing two maize crops in both seasons has made him more productive and able to reduce, if not get rid of, food problems. The farmer is presently more self-sufficient in food than he was before the FSR project.

However, the impact of FSR project on food self-sufficiency at district or regional level has been moderate because most of the farmers are yet to adopt the technology due to:

(a) unavailability of maize seeds,

(b) non-storability and commerciality of Kito and TMV-1 maize, and

(c) inadequate involvement of extension in FSR activities.

The above factors also affect the sustainability of food self-sufficiency at the individual farmer level.

3.9 IMPACT ON FARMERS' INCOME

One of the ultimate objectives of the implementation of FSR project was to increase the farmer's income. A comprehensive evaluation of the project's impact on the farmer's income and therefore on his standard of living would entail an extensive income-budget survey throughout the pilot project area. Such a survey would have required considerable time which the consultants did not have.

However, quick gross margin estimates (see Appendix 3:J) for maize and cotton, and returns to labour (Appendix 3:K) for maize, reveal that the farmer is now better-off by growing Kito and Staha. Moreover, the opportunity to grow the two maize varieties in relay cropping or by relaying Kito with cotton in the vuli season still makes him much better-off than when he grew his local maize varieties.

Implicitly, the maize farmers can now use the money previously spent to purchase food in years/seasons of food shortage to improve their well being by, say, purchasing more clothes, improving their houses, buying more protein foods, buying bicycles etc. However, these facts can only be clarified by a budget-income survey for the Kilosa district in which the FSR completed two cycles.

4. CONCLUSIONS

4.1 ACHIEVEMENTS OF THE FSR PROJECT AND FSR APPROACH ACCEPTANCE

The FSR project was successful as a link between agricultural research and the farmer. The success has been achieved through the introduction of the Kito maize variety which can be grown in the vuli season and the growing of a second maize crop during the masika season. The FSR project has also helped to improve the farm husbandry practices, particularly for farmers who participated in FSR on-farm trials.

The FSR methodology has been accepted not only as a research methodology but also as a channel to transfer technology to farmers. FSR has been institutionalized within MALD agricultural research structure and organized on zonal basis to cover the whole country and is being used in agricultural research.

The project recognized the key role played by women in agriculture and involved them in on-farm trials. However, the project did not make them the primary target of technology transfer.

The farmers who participated in the FSR project are now more productive because they can produce more maize than before. However, the project's overall impact has been modest. The overall project impact is summarized in Table 1.0.

Although the project had a modest impact, its major shortcoming was its exclusion of livestock and non-farm activities.

Table 1.0 SUMMARY OF THE IMPACT OF THE FSR PROJECT

PROJECT EFFECTS ON	IMPACT		
	Considerable	Moderate	None or insignificant
1. FSR in technology transfer	X		
2. Technology adoption			
- new varieties		X	
- husbandry practices	X		
- cropping systems	X		
3. Interaction between research, FSR and extension		X	
4. National agricultural policy		X	
5. Increase in food production	X		
6. Food self-suffiency		X	
7. Increase in farmers' income		X	
8. Management of agricultural researc			X
9. Training/human resource development		X	
10. Publications and their use		X	
11. Land development at Ilonga		X	
12. Research stations development			
- buildings	X		
- utility			X
13. Women involvement in FSR		X	

4.2 CONSTRAINTS

The impact of the FSR project was affected by various constraints right from the beginning. These are as outlined below:

1) Funding

The Brooke Amendment resulted in reduced funding for the project. Consequently the project was only implemented in three districts instead of the planned fifteen. In addition, the low funding affected availability of funds for project operation and training.

2) Transport

The low funding of the project resulted in inadequate transport to conduct and monitor on-farm trials.

3) Weak TARO Management and Technical Advisors/Counterparts Interaction

This resulted into ineffective management of agricultural research and co- ordination of the FSR project. Furthermore, it restricted the effectiveness of the technical advisors.

Indeed, TARO was late to assign counterparts to the technical advisors and this affected operations of the project.

Nonetheless, the advisors had weak interaction with their counterparts and this resulted in inadequate assistance to TARO in planning and managing research.

4) Limited interaction among FSR/commodity research/extension

The response of reseachers to FSR feedback is still low and the involvement of extension is passive.

5) Short time of project

The time provided for implementing the project was too short to achieve the planned project objectives.

4.3 THE PROJECT APPROACH TO FSR METHODOLOGY

The project approach was adopted to implement the FSR methodology because:

(i) the FSR methodology was a new concept which required introducing and testing under Tanzania farmer conditions,

(ii) there was need to develop and train pesonnel to man and implement the new concept to agricultural research.

To implement the project, a substantial employment of technical advisors in FSR and adequate funding were necessary.

However, the project approach to FSR is presently not appropriate because:

(i) the FSR is now institutionalized in MALD agricultural research structure,

(ii) there is a base of well trained scientists with adequate experience in agricultural research, and

(iii) there is need to implement a complete FSR package which includes livestock and other off-farm enterprises, thus demanding a more elaborate plan and longer period of implementation.

PROJECT OBJECTIVES AND OUT-PUTS AS PER PROJECT DOCUMENT

The objectives to be accomplished under the FSR project included:

(i) To develop and institutionalize a national research organisation (TARO) which is capable of sustaining and extending adaptive (on-farm) food crop research on a national scale.

(ii) To develop and test a methodology for using the farming systems approach as a research and information dissemination strategy.

(iii) To integrate the farming system research approach with ongoing food crop research programmes.

(iv) To develop and test improved technical recommendations for increasing food crop production by Tanzanian smallholder farmers.

(v) To integrate the activities of the agricultural research organisation with the activities of other Government of Tanzania (GoT) institutions serving the agricultural sector at local levels to improve the transmission of research results to smallholder farmers.

(vi) To develop the skills of Tanzanian researchers in basic (on-station) and adaptive (on-farm) food crop research.

The original contract document listed the following principal outputs which would be achieved by the project upon completion:

(a) The FSR concept will have been field tested and will be operating in 15 (finally revised to 3) of the country's 82 districts.

(b) The interactive process involving researcher, extension agent and farmer will have produced survey information to modify/adjust food crop research leading to better adapted varieties and more relevant recommendations.

(c) Long-term planning, budgeting and interaction of the Government research, extension and training institutions will have significantly improved.

The envisaged outputs were as follows:

(i) The pilot FSR approach will have been field tested in two geographical zones. Tanzanian research and extension personnel will have received sufficient training in the approach to enable the Government to continue the approach in these and other areas should there be a decision to do so.

(ii) TARO and MALD annual budgets for research and extension activities will have begun to reflect priorities established via the FSR approach.

(iii) Planning, budgeting and management training dvice and counsel will have been offered to cooperating units aimed at the preparation of annual budgets that would take into account and propose the implemkentation of findings from the FSR activities. On commitment of the Government to such proposals, management assistance will have been made available to aid in their orderly execution, including the development and monitoring of research projects and extension, plans of work, the handling of funds and accounts and other management concepts and procedures for effective research and extension.

(iv) Within the pilot-scale areas, farmers' needs will have been identified through the diagnostic and verification survey processes of FSR. This will have been followed by station research and intensive field trials on farms and in villages to test crop varieties and farm practices that address high priority needs. Such trials will have undergone agronomic and economic performance testing and evaluation in each crop season to determine acceptance and adoption potential. Recommendations for demonstration trials will have been made where evaluations indicate good potential for farmer acceptance and adoption.

(v) Constraints to technology adoption by farmers including governmental policies that affect the performance of the agricultural sector will have been identified and assessed with results of the analyses made available to TARO.

(vi) Nine (finally revised to 5) participant trainees will have been provided two years post baccalaureate training in the U.S. in the disciplines of maize breeding, agronomy, agricultural economics and plant protection (plant pathology and entomology).

STUDY OBJECTIVES AND SCOPE OF WORK

1. STUDY OBJECTIVES

TISCO consultants shall carry out a study to evaluate the impact of the Farming Systems Research project in the pilot districts of Kilosa and Moshi, with particular emphasis on:

1) whether the farmers in the pilot districts are now more productive than they were before the FSR project was introduced to them,

2) whether institutionalisation of research capability has been sustained,

3) whether on-farm testing was achieved and sustained under FSR principles, and

4) identification of actual beneficiaries and participants in the course of project implementation.

2. SCOPE OF WORK AND APPROACH

To be able to effectively accomplish the objectives of the study, TISCO will carry out each of the following aspects.

2.1 Review of Research Policy

- Gather information and facts about agricultural research guidelines in the country prior to and during the project and those currently in force.

- Review the project objectives in view of the sectoral and national objectives.

GD

In order to accomplish the above aspects, the consultants will gather reports and carry out interviews with relevant officials in the Ministry of Agriculture and Livestock Development, relevant research institutions (Ilonga and Lyamungu) and individual researchers.

2.2 FSR Methodology

- Define and elaborate on FSR methodology.
- Explain how the methodology is being practised in the two pilot areas.
- Determine extension of methodology beyond the project pilot areas and constraints involved.
- Discuss seed varieties of crops introduced during the project and the extent of their continued use and production.
- Explain benefits acquired by farmers using these varieties.
- Comment on effects of project on GOT agricultural policies.

This extent of coverage will be achieved through:-

- Sample interviews of farmers in project villages,
- Interviews with research personnel and extension staff in concerned areas and discussions with village leaders,
- Analysis of agricultural policies and gathered reports on the projects,
- Discussions with seed producers/distributors.

2.3 FSR Training

- Review documents related to FSR training programme,
- Determine how many teams were to have been trained and how many were actually trained,

- Determine contribution of FSR training to the FSR approach to adaptive research,

- Evaluate the role played by trained FSR participants during the project and after,

- Determine which of the FSR publications are read and used in activities related to the project or any other.

The above scope areas will be covered through:

- Studying of published FSR documents.

- Discussions with a sample of FSR trained participants.

- Studying of some published research documents findings.

- Physical visit to some of the farmers' plots.

- Discussion with lecturers at Sokoine University of Agriculture (SUA), library and documentation personnel at Ilonga and Lyamungu research institutes and those at SUA Library to determine readership statistics for the publications.

2.4 Human Resource Base

- Determine the number and level of training of personnel involved in food crops and adaptive research,

- Determine the number of scientists trained by the predecessor agricultural project who are still working for TARO - FSR programme,

Coverage under this section will be accomplished through the following approach:

- Talk to directors of research at institutes in the pilot areas to establish the number and competence levels of personnel who were available before, during and after the project.

- Evaluate the personnel deployment records kept at the institutes for the various crop research programmes to establish the number involved in food crops research and adaptive research.

- Discuss with research directors the role played by agricultural economists and social scientists in their TARO - FSR programme.

2.5 Management/Coordination System

- Study the research organisational structure prior to the project, during the project and at present.
- Review the FSR project organisation.
- Study the MIS being practised in carrying out research programmes, in particular that of the FSR project.
- Determine farmers' production organisation and whether the FSR project has had any contributing effect This should be moved to previous page.

To realise the above coverage, the consultants will;

- Interview research directors and planners at the pilot area institutes and the Ministry headquarters,
- Hold discussions with selected farmers who have been involved in the programme and main extension workers at district headquarters.

2.6 Land and Research Station Development

- Determine the number and use of research building, housing and other infrastructure at Ilonga and Lyamungu Research Stations.
- Determine and explain the utilisation of developed research land at Ilonga and Lyamungu.
- Review station development plans in the short and long term perspective.
- Discuss resource requirements for sustained crop research.

TISCO will achieve this through the following;

- Carry out visits to the research institutes and inspect existing buildings/facilities and their uses.
- Visit sites for developed research land.

- Review institutes' development programmes by studying project documents.

- Hold discussions with directors/planners at the institutes and Ministry headquarters.

- Hold discussions with selected research officers at the research stations.

2.7 Review of Studies Done

- Study and draw out a summary of findings of the studies done on the role of women in agricultural production and marketing.

- Discuss main findings and determine whether they have been implemented/utilised and constraints thereof.

Results of these studies will be established through discussions with officials of the research stations, district offices and Ministry headquarters.

The distribution of work between women and men in the project areas will be outlined after interviewing a sample of men and women.

2.8 Women in Development

- Identify the main participants in the FSR programme at farm level.

- Determine how the new technology package is received and initiated at the farmer's plot.

- Determine the role of women in the whole process of introducing new techniques in agricultural production.

- Suggest and discuss methods for effective participation of all family members in the FSR approach, emphasising the role of women.

To accomplish this, the consultants will;

- Carry out interviews with a sample of village women involved in the pilot project.

- Use results of women studies with TISCO,

- Discuss with economists/extension staff at research stations and district offices.

To make sure that all information is collected, a questionnaire for data collection will be prepared and used as a basis for the interviews to be conducted.

3.0 YIELD

The study will come up with a detailed evaluation report on the impact of the Farming Systems Research Project with reference to Ilonga and Lyamungu pilot areas.

The Report will contain the following:

- A review of FSR documents connected with the project.
- Outline of National Agricultural Policy with respect to agricultural research.
- Details on effects of the FSR project on farmers' development activities.
- An analysis of pros and cons of FSR approach to food crops research.
- Information on main actors and beneficiaries of the FSR project.
- Contribution of the FSR project in the development of national research capacity with emphasis on human resource and infrastructure.
- Review of finance management and coordination under the FSR project.
- Suggestions and recommendations.

4.0 STUDY EXECUTION SCHEDULE

In order to accomplish the work in the given period of 25 days, the consultants suggest the following schedule:

a) Mobilisation - 7 days

This phase will have a duration of one week prior to commencement of the work. This period will enable the consultants to get prepared to start the project by making necessary appointments and travel arrangements.

b) Collection of Published Literature from USAID and Ministry of Agriculture and Livestock Development - 7 days

TISCO will collect all FSR documents and the various project reports and questionnaires from USAID and the Ministry (KILIMO) headquarters.

The consultants will study the documents and draw out a questionnaire for carrying out the data collection in the pilot areas.

They will also hold preliminary discussions with officials responsible for agricultural research at KILIMO headquarters.

c) Field-trip to Ilonga and Lyamungu - 10 days

For 10 days the consultants will collect information and have visual inspection of project areas at Ilonga and Lyamungu research stations.

During these days the consultants will interview research and extension staff and talk to a sample of village farmers.

A day will be devoted to discussions with Sokoine University of Agriculture staff at Morogoro.

d) Data Analysis and Report Drafting - 8 days

After collection of information the consultants will undertake analysis of data and compilation of the Draft Report.

A second round of talks with officials of the Ministry of Agriculture and Livestock Development will be held.

A draft report will be submitted to USAID 25 days after official commencement of study.

IMPACT EVALUATION STUDY OF THE FARMING SYSTEMS RESEARCH PROJECT

DRAFT QUESTIONNAIRE

I. METHOD USED TO STRUCTURE THE QUESTIONNAIRE

The method used is semi-structured type of INTERVIEW questionnaire which allows the respondents to express themselves and the interviewer to ask other relevant questions without being outside the framework of the major questions. It is quick and relevant to the short-time allocated for the task.

II. THE QUESTIONNAIRE

REVIEW OF RESEARCH POLICY

- Can you explain the Ministry of Agriculture and Livestock Development (MALD) research guideline before the 1980 agricultural policy.

- What were the research guidelines of the 1983 agricultural policy?

- How do you evaluate the relevance of the research guidelines to the agricultural policies stipulated in 1983?

- What research guidelines are now in existence?

- What type of agricultural research is now on going?

- How relevant is that ongoing research to the agricultural research guidelines?

- Are you aware of the FSR project financed by USAID which started in September, 1982 and was completed/terminated in 1986?

- How do you evaluate the relevance of the FSR project to

  (i) the research guidelines/policy in existence then (1982 - 1986) and at present.

  (ii) the sectoral/national objectives.

- How would you have liked the FSR project adjusted to be more relevant to the research guidelines and the sectoral/national objectives?

- In your view, how would you evaluate the total impact of the FSR project?

- In your own words what would you say is the agricultural policy towards research?

- Do you think the policy takes care of other inter-related aspects e.g. extension services and social welfare?

- Do you think there are any changes which need to be incorporated in the policy?

3.2 FSR METHODOLOGY

- Can you define and explain the FSR methodology used in the FSR project?

- Why did you use that methodology and not other FSR methodologies or research approaches which existed before 1982

- What was the FSR project's major emphasis?

- What did you expect from implementing the FSR project?

- How many districts and farmers were covered by the project?

- Do you still implement the FSR methodology? Give reasons.

- What major changes/adjustments did you make during FSR project implementation?

- Why did you make such changes/adjustments?

- What major problems/constraints did you encounter in implementing the FSR project?

- How did you respond to them?

- What seed varieties and new technology packages were introduced during the project?

- Where did you get the seed varieties from - were they developed or imported?

- How did the new seed technology reach the farmer?
- Did you have seed farms?
- Why did you have them?
- How much seeds did those farms produce per year?
- Did you sell any seeds to TANSEED?
- If yes, how much?
- What is the % of the seeds from the FSR farms to the national requirements?
- Which of the farms still exist?
- How do you evaluate the performance of those farms?
- What problems/constraints did those farms face?
- Did you have contact farmers?
- If yes, how did they perform?
- Why do you think they failed in their duty?
- How did TANSEED fit into the FSR project?
- You mentioned TANSEED produces "certified" seeds - what exactly are certified seeds?
- Was there any Seed Act to enforce the use of certified seeds?
- In your view did farmers use those certified seeds?
- Do they still use them?
- How do you evaluate the performance of TANSEED?
- How did you get fertilizers?
- How did you pass the same to the farmer?
- Can you comment on the general awareness of the FSR technology package by the farmers.
- Did you carry out "Adaptive Research" and "Applied Research?

- What did you do in each case?
- What problems/constraints were encountered?
- How did the FSR project respond to them?
- Why do you think the FSR project could not solve some of those problems?
- You mentioned Kito maize variety - how was it developed?
- What are its main agronomic attributes?
- How did the farmers respond to the variety?
- How much seeds were distributed to farmers?
- Why do you think the seed requests decreased/increased?
- How do you evaluate the success of Kito maize?
- How was the FSR project linked with extension in the project area?
- What type of extension system was applied? (T & V system?)
- How many extension personnel served in the FSR project?
- How was the cooperation between researchers and extension personnel?
- How many farmers are in the pilot project area and how many used the seed varieties fertilizers etc.
- How many contact farmers still use the seeds and FSR technology packages?
- How do you explain that trend?
- How many trials/demonstrations were started by the FSR project?
- How many still exist and how many were established after 1986?

- What were the average yield levels of the project seed varieties and how do they compare with those of the traditional seeds?

- How would you explain the reason for yield increase/decrease?

- What are the present production levels of the farmers who were involved in the project?

- What do you think were the major problems/constraints encountered in diffusing the technology package of the FSR project?

- How would you evaluate the effect of the Brooke Amendment Act on the impact of the project?

- What is your general comment on the effectiveness of the research extension incharge implicit in the FSR methodology?

- Can you explain how the project benefited farmers in the project area?

- Do the farmers now have more food than before the project?

- Were the farmers able to implement the FSR project technology package?

- How did you prepare the farmers to implement the FSR technology package?

- What was the role of women in the project area before the project?

- How were women involved in the project e.g. in trials, demonstrations, meetings and extension contacts?

- How many women farmers actually took or made production decisions?

- How many women were extension officers during the project?

- How would you comment on the overall effect of the FSR project on Government policies regarding:

(i) Research extension linkage

(ii) Smallholder agricultural modernization

(iii) Food self sufficiency

(iv) Strengthening of extension and research

- Was the FSR project introduced for the first time in Tanzania in 1982?
  How does it differ from the Agricultural Research Project?

- How is FSR practised in pilot project areas?

- Is it limited to food crops only?

- Do you think the FSR methodology has brought any success in the project areas? What are they?

- Can you elaborate on the peculiar features of the technology packages introduced?

3.3 FSR - TRAINING

- How many persons went for training by level of training (Phd, MSc, Diploma etc)?

- How many of those were women?

- How many persons went for field training
  - extension staff
  - farmers

- How many successfully completed their training, returned to Tanzania and joined TARO?

- How many were allocated to

  * The FSR project?

  * Food crop research?
  * Related research in agriculture?

- How many still work for programmes initiated by TARO and the FSR project?
- What happened to those who left TARO and the FSR project?

- Why did they leave?

- How do you assess and evaluate the performance of expatriates in respect to on-job-training?

- How do you evaluate the contribution of FSR training to FSR adaptive/applied research?

- Do you still train extension staff/farmers in the field?

- How many extension workers/farmers are trained per year?

- How did the Brooke Amendment Act affect your training programme?

- To what extent do you think the FSR objectives were affected? If you were given a ranking order which problems would you rank as the most critical on

  (i) training
  (ii) impact of the FSR project

- How many FSR publications were produced?

- How many were distributed to:
  - research workers?
  - farmers?
  - extension workers?

- How do you evaluate the extent of the awareness of, accessibility to and application of principles of FSR publications by readers?

- Have you made any follow-up on the effect of these to the project?

- In your view if the project was to start now how would you have liked the approach, staffing and training to be?

- Do you think Tanzania could as well have used more Tanzanian experts and less expatriates and training?

- How was the training programme organised by the project?

- What criteria did you employ in picking candidates for training.

- What were you targets and what did you actually achieve?

- What tangible results have been realised from the programme?

3.4 HUMAN RESOURCE BASE

- In view of the FSR project training programme and the achievements of the previous Agricultural Research Projects in training, how do you evaluate the adequacy of the personnel allocated to food crop research and adaptive research?

- How many of those scientists still work for the FSR project and how many have left and why?

- How do you evaluate the competence and performance of those scientists in food crop and adaptive research?

- What type of scientists were allocated to research in the field?

- How do you evaluate the competence and performance of the agricultural production economists and agricultural agronomists in adaptive research?

- How many extension workers/farmers were involved in adaptive and applied research?

- How do you evaluate the performance of extension services in general?

- How was the performance of women extension officers?

- Why did you involve farmers in adaptive and applied research?

- What did the farmers do?

- How many farmers remained involved in the pilot project up to 1986?

- How do you evaluate the enthusiasm and acceptance by farmers of their role in the project?

- To what extent do you evaluate the success/failure of adaptive research to strengthen the research - extension - farmer linkage?

- What is your general view of the contribution and the success of FSR methodology?

- During the project period how many scientists and research hands were involved in food crop research?

- How many were deployed to the FSR project? What number would have been adequate?

- How many scientists still work for food crop research?

  Any reasons for the change in number (especially if declined)?

- Did you require the services of economists or any other social scientists? Why or why not?

3.5 MANAGEMENT/COORDINATION SYSTEM

- What were the strengths/weaknesses of the research organization prior to the start of the FSR project?

- If there were weaknesses, how did the FSR Project solve them or improve the organization coordination system?

- How do you evaluate the role and performance of Ilonga in the FSR project?

- What was the role of TARO in the FSR project?

- To what extent do you think TARO achieved/failed to achieve that role?

- TARO had the task of organizing, planning and developing budgeting procedures and controls for agricultural research in order to facilitate the success of the FSR project - to what extent, in your view, did TARO manage to fulfil that task?

- In your view was TARO necessary or could MALD's Research Department have carried out TARO's role?

- What do you think were the major problems that faced TARO?

- What were the roles of CID and CSU/OSU?

- Did they actually carry out their roles?
- How do you evaluate the performance of CID?
- Why do you think the CSU had to be dropped and instead OSU chosen for training Tanzanian FSR experts?
- How do you compare the technical assistance budgets which went to expatriates, training and strengthening TARO?
- What is your comment on the general project fund utilization?
- Despite the reduction of the funding for the project why do you think the FSR project failed to utilise all the funds allocated to it?
- Do you think it could have been possible to implement and coordinate the original project plan or do you think the Brooke Amendment Act was a blessing in disguise?
- What lessons can you draw from the implementation experience of the FSR project?
- What is the present organization structure of Agricultural Research?
- How efficient is it compared to that which existed between 1982 and 1986?
- Why do you think the MALD had to disband TARO? Was it to create new organizational structure in operation?
- What is the role of the Zonal Directors of research vis - a - vis MALD's?
- How do you evaluate the appropriateness of the new organizational/coordination system in facilitating the implementation of the FSR methodology?
- What type of scientists are allocated to research in the field?
- To what extent did the scientists in food crop research liaise with those in adaptive research?

- Was there any formal forum or how was that liaison achieved?

- How many scientists were deployed at TARO Head Office and what were their roles?

- How do you evaluate their performance in executing those roles?

- How do you assess and evaluate the general performance of expatriate staff in the FSR project?

- Did you have any problems with any particular expatriates?

- Why did Dr. Mann & Dr. Tang leave Tanzania?

- What problems did you get in organising and directing such heavy dose of expatriates?

- How do you assess the participation and performance of Tanzanian counterparts?

- How about the general performance of Tanzanian experts in the project?

- Who in the new structure will be responsible for the determination of research objectives and priorities?

- Let us go back to the FSR project-to what extent did it liaise with production institutions serving the farmers?

- How did the FSR project solve or assist in solving production/distribution problems facing such institutions e.g. group farming, cooperatives etc.?

- To what extent did the FSR project attempt to solve credit and other sociocultural constraints?

- What problems/constraints were met in that endeavour?

- How did the FSR project adjust to them?

- Can you tell us how the FSR project was organised?

- How were funds kept and disbursed?

- What differences were there compared to the conventional research organisation and funding procedures?

- Can you single out any administrative/communication constraints that existed in the FSR project? Who had the final say on funds disbursement and administrative matters?

- How did you select villages for involvement in the project? Was it different from how you selected prior to the project?

- What in your views were the achievements of the FSR project?

- Can you elaborate on the changes TARO has undergone since its inception 1982? Do you think you are stronger now?

- What effects did the change of management assistance from CID to USAID have on TARO? Which was better and why?

3.6 LAND AND RESEARCH STATION DEVELOPMENT

- How much infrastructure was established at Ilonga and Lyamungu?

- How have you been utilising that infrastructure?

- What buildings/land were for basic crop research and FSR research?

- What percentage of those buildings/land was allocated to the FSR project?

- What were/are research project at Ilonga and Lyamungu between 1982 - 1986 and 1986 - 1989?

- Which were for basic and FSR researches?

- How much funds were budgeted and spent on food crop research; FSR research and land development at the stations?

- To what extent did Ilonga succeed to get all the land it required?

- How much station land was used to maintain and breed seeds over the years?

- Do you have any future plans? If no, why?
- If yes, who set the objectives and priorities?
- Can you estimate the future financial requirements to implement your crop research programme?
- Where do you expect to get the funding for your plan?
- To what extent did the feedback from applied and adaptive research influence the station development at Ilonga and Lyamungu?
- What priorities did you have on station development in 1981/82?
- What facilities did the FSR Project bring/built?
- How do you use them today?
- Do you think infrastructure development such as that made at Ilonga needs to be repeated elsewhere? Elaborated.

3.7 REVIEW OF STUDIES DONE

- Was the FSR project supposed to do studies on women?
- What studies have been done about the role of women in production and marketing between 1982 - 1986 and 1986 - 1989.
- What were the major findings of those studies?
- How did the FSR project accommodate those findings in:
  - (i) its designing or redesigning of the FSR methodology
  - (ii) staff deployment
  - (iii) applied and adaptive research
  - (iv) dissemination of technology to farmers
- What problems/constraints were encountered in implementing the study findings?

- How do you evaluate the trend of development in distribution of work and decision making between women and men?

- Which studies published by the project do you consider quite useful today? Why?

- Who are the main readers/users of FSR publications?

- How do they know about these documents?

- Do you have adequate copies for use by the readers?

3.8 WOMEN IN DEVELOPMENT

- How many women were deployed in adaptive/applied research and extension?

- What was the percentage of women in the total personnel deployment?

- How many women attended field trials and demonstrations?

- How many were women farmers?

- How many women farmers were visited by extension workers at their farms?

- How many women (as a % of men) applied the FSR technology?

- Who make decisions on farming/production/marketing and use of funds - men or women?

- What problems/constraints were met in involving women in the FSR project and how did the project adjust to them?

- What is your view of how to involve women/all family members effectively in the FSR approach.

- In your experience what role do women play in adaptive research?

- How did the FSR project involve women in its programme?

- What suggestions would you wish to give in this regard?

- How (lady-peasant) are you involved in decision concerning agricultural production?

- How often do agricultural workers talk to you (women)? Mostly during which part of the year?

- What advantages have these agricultural workers brought to your shamba? Do you think they helped you? Please elaborate.

- What suggestions have you to make? Are the new seeds better than the ones you used before? How or why?

- Generally what are your responsibilities regarding farm activities (men/women)

- Can you comment (farmer) on the relevance or Ilonga/Lyamungu research to your shamba activities?

3.9 GENERAL (DIRECTORS/RESEARCH OFFICERS)

- What are the good things the FSR project has brought?

- What were the main shortcomings of the total approach to agricultural research?

- There is a general feeling that efforts to institutionalize TARO as a research coordinating body completely failed, can you comment on that?

- Any suggestions for revitalising the project? In what direction? or what kind of assistance would suit you? Why?

3.10 QUESTIONS DESIGNED FOR FARMERS IN PROJECT AREA

- General questions
  - What is your name?
  - No. of people in the family
  - Crops grown
  - Total area of farm
  - Area under each crop
  - Able labour
  - Use of family labour
  - Hired labour and for which operations
  - Payment for labour/seeds
- What type of seed varieties are used?
- When did you begin using them?
- Why did you use them?
- How did you get the seeds?
- How much did you pay for them?
- Are you aware of Kito maize seeds?
- Were you able to continually use/get the seeds?
- What did you use when they were not available?
- Did your yield increase or decrease with the seed varieties?
- What were the reasons in each case?
- How do you rate the quality of the seed varieties?
- Do you still use the seeds? If no, why?
- How do you like the taste of the new hybrid seeds?
- How does it compare with that of traditional seeds?
- Do you use fertilizers?
- How do you get them?
- How much do you pay for them?.
- Can you explain how you plant your seeds and apply fertilizers

- What is the spacing of seeds and number of seeds per hole?
- How do you do it?
- Are you aware of the FSR project which ran from 1982 to 1986?
- How did you come to know about it?
- Can you explain what you know about it?
- What services did you get from the project?
- Did you have any special relationship with the project? (contact - farmer)?
- Do you like continuing that relationship?
- Why in each case?
- If you were not in the project, did people from it visit you?
- Why did they visit you?
- Do they still visit you?
- Do you remember when they last visited you?
- How many times do you remember to have had such visits?
- Did you like such visits?
- In your view what benefits do you think you got from the FSR project?
- What problems/constraints did you get from your special relationship to the project?
- How do you evaluate the performance of extension and research officers you cooperated with?
- Do non-contact farmers visit you and do you ever have discussions about extension recommendations with them?
- If you were not in the project was any of your family members involved?
- If not why.

KILOSA DISTRICT: AWARENESS, ADOPTION AND REPEATED ADOPTION OF TECHNOLOGY

TECHNOLOGY	AWARENESS			FIRST ADOPTION			REPEATED ADOPTIONS			FARMERS WHO STOPPED GROWING LOCAL VARIETIES		
	No.Farmers	No.Farmers Aware	% Awareness	No Farmers	No.Adopted	%	No Farmers	No Farmers	%	No Farmers	No Farmers stoped	%
Kito maize seeds variety	12	12	100	12	12	100	12	10	83	12	6	50
Staha maize seeds variety	12	12	100	12	12	100	12	11	92	12	6	50
TMV-1 maize variety	12	5	50	12	5	42	12	4	33	12	6	50
Sorghum (Tegemeo)	12	5	50	12	2	17	12	1	8	12	-	-
Cowpeas	12	12	100	12	9	75	12	9	75	12	-	-
The Canadian Wonder Bean*	12	2	17	12	2	17	12	2	17	12	-	-
Crop husbandry practices	12	12	100	12	11	92	12	10	83	12	-	-

* The Canadian Wonder Bean was recently introduced to the farmers and many farmers are no aware of it. It was introduced to observer farmers in 1988/89.

Appendix 3:A

KILOSA DISTRICT: AWARENESS, ADOPTION AND REPEATED ADOPTION BY CATEGORY OF FARMER

PARTICIPANTS BY CATOGORY	No. of Farmers Inter-viewed	AWARENESS		FIRST ADOPTION		REPEATED ADOPTION		FARMERS WHO STOPPED GROWING LOCAL FARMER SEEDS	
		No. of Farmer	% Aware-ness	No. of Farmer	% Adop-tion	No. of Farmer	% of Re-peated Adop-tion	No. of Farmer	% of farmers who changed to new Techno-logy
1. Contact Farmers	10	10	100	10	100	8	80	6	60
Men	9	9	100	9	100	8	89	6	67
Women	1	1	100	1	100	1	100	–	–
2. Observer Farmers									
Men	–	–	–	–	–	–	–	–	–
Women	2	2	100	2	100	1	50	–	–

Appendix 3:B

KILOSA DISTRICT AND MOSHI DISTRICT: EFFECT OF SOME SOCIO-CULTURAL FACTORS ON CONTACT FARMER PERFORMANCE ON FSR ON-FARM TRIALS

PARTICIPANT BY CATEGORY	No. of. Farmer Inter-viewed	SELECTED SOCIO-CULTURAL FACTORS								Good Performance in FSR on-form Trials	
		Owner of land		Deci-sion maker		Control Revenue & Expe-nditure		Off-form Income			
1. Contact farmers		No.	%	No.	%	No.	%	No.	%	No.	%
Men	15	15	100	15	100	15	100	5	33	14	93
Women	2	-	-	1	50	-	-	1	50	1	50
2. Observer farmers											
Men	-	-	-	-	-	-	-	-	-	-	-
Women	2	2	100	2	100	2	100				

Appendix 31C

96

TRIAL DETAILS FOR KILOSA AND MOSHI

In implementing the FSR approach the initial activities involved farm surveys which included the studying of the farmers production system and how it affected his social - economic well being. These circumstances were then to be brought back to station to design research packages which would be directed to the farmer constraints/priorities. Thereafter trials on station and at village/farm level would follow.

The FSR project has to carry out to surveys initially before conducting the trials.

The surveys carried out in the villages were undertaken after consultation with extension staff at district level and the villages concerned. In the villages, the village chairman was involved in the initial contacts.

THE ILONGA ZONE - KILOSA

In the Ilonga survey teams composed of the station FSR team which included the economists/sociologists and agronomists teamed up with district extension personnel to carry on the survey. Initially presurveys (reconnaissance surveys) were done, which after analysis of information led to more thorough verification surveys. After that the team with assistance of the village chairman (in the case of Kilosa) picked 20 smallholer farmers. Out of this a random sample of 10 farmers was done. After that the FSR team talked to these 10 farmers and divided them in two groups each of five. One group would host on-farm trials and the other would be given the technology package to try on their own with assistance from village extensionist. The trials were to be carried on ¼ acre plots. In Kilosa 12 villages were involved, in 3 ecological zones of south, central and north. Trials carried out in the villages were based on the priorities and constraints obtained from the farm surveys and from results of FSR team discussions with commodity researchers on station.

For Kilosa, the trials were to provide solutions to farmers priorities and problems identified as:

1) Maize, rice and cotton as major crops. Other crops include pigeon pea, cowpea, simsim, bananas, and cassava.

2) Maize is usually grown in association with other crops such as rice, cowpea, cotton, cassava, sorghum and pigeon pea.

3) Farmers concentrate on planting maize in November - February (vuli) contrary to February - March (masika season). This is so because they want to solve the food shortage apparent in February - March period and avoid labour competition with crops such as rice and cotton during masika season. Nonetheless there is a high tendency of streak virus incidents on maize during masika.

4) Cotton is relay cropped between rows of maize in month of February in defiance to the bylaw which forbids any form of inter-cropping maize with cotton for fear of exacerbating the problem of Heliothis armigera to which maize is an alternate host.

Thus, experiments designed were;

(i) Maize varieties x density trial
(ii) Maize varietal evaluation trial
(iii) Kito x early cowpea/green gram inter-cropping
(iv) Maize/cotton, cotton/cowpea inter-cropping
(v) Sorghum varietal evaluation trial.

These trials were based on newly released varieties and technologies which had not reached the farmer.

(i) Maize Varieties x Density Trial;

The objective of this experiment was to determine optimal plant density to optimize crop yield. It was believed that the low plant density (27,000 plants/ha as opposed to 44,000 and 66,000/ha) recommended for long and short maturing maize varieties respectively contributed to farmers' low yields.

The two year results of the 1984/85 and 1985/86 reasons indicated that a 13% increase (1.41 r/ha to 1.6 t/ha) was realised when plant density was increased from low to high density. However, this increase had not really convinced the farmer to increase plant density. The farmers have the view that the wider spacing save them time during both planting, weeding and to relay with cotton.

(ii) Maize Varietal Evaluation Trial;

The objective of this experiment was to determine a suitable variety of maize which would resistant to streak when planted in masika as opposed to the non-resistant varieties.

For this trial Staha was found to give better yields compared to the local varieties of the farmer.

At 1.4 t/ha Staha yielded about twice the yield of the local variety (0.8 t/ha).

Staha and another variety (TMV-1) have now been substituted for the local variety. TMV-1 variety is more streak resistant than Staha.

Another set of experiments was carried out to determine the performance of maize varieties when planted as short season (vuli) crop or as main season (masika) crop. The 1984/85 - 1985/86 experiments showed good performance for the vuli crop apparently due to the good management offered by the farmer on the crop as compared to the masika reason when there was high labour demand for other crops, namely rice and cotton.

These results were not striking to the smallholder farmers who were not used to planting maize in masika, and were less so to the commercial farmer who has interest in the main crop grown during masika.

(iii) Kito x Early Cowpea/Green Gram Inter-cropping

This experiment was initiated to transfer the successful packages developed on-station to the farmers, so as to increase the availability of food crops. Although on-farm trials have been promising, farmers' acceptance to date is still low. This is most likely due to increased labour demands and added cost for legume sprays.

(iv) Maize/Cotton and Cotton/Cowpea Inter-cropping;

This was an on-station trial, but aimed at investigating the farmers' practice of relaying maize and cotton to ease labour problems

involving ploughing, planting and weeding of cotton. Cotton is planted after maize in the masika season.

The experiment showed positive results inspite of reduction of cotton yields by 30% when relayed with Kito and 63% on relaying with Staha.

Presently farmers growing cotton find it quite advantageous to relay with Kito.

Intercropping of cotton with cowpeas has also been tried as a way of taking advantage of cotton sprays in controlling cowpea pests. These trials are still ongoing.

(v) Sorghum Varietal Evaluation Trial;

This experiment was initiated as normal on-station trial and later tested in demonstrations in the field. Although the Tegemeo sorghum seed has been ready since 1984, it was not known to the farmer until 1986/87 through FSR initiative.

The variety is high yielding (3t/ha), about twice the local variety on experimental plots. Moreover the variety is millable and has better culinary qualities. Nonetheless farmers adoption is slow as the variety has a thin/stall which is inferior to the farmer's local stalk used for house thatching and other construction work.

In the case of Moshi, the selection of farmers was slightly different from that of Kilosa. In Moshi 5 villages were involved and for each village 4 farmers were picked for the trials.

NORTHERN FSR ZONE - MOSHI

Moshi was different from that of Kilosa in that the two are ecologically different social and have different social-economic set-ups. The diagnostic surveys carried out by the FSR team revealed the following farmer circumstances in the zone,

(i) the zone is divided into lowland (below 800m) middle attitude (800 1500m) and high attitude (above 1500m) ecological zones calling of different cropping patterns,

(ii) Farmers here have a problem of limited land, and that many live on the high attitude and maintain food crop farms in the low land.

(iii) Farms have traditional cropping system of inter-cropping at livestock keeping (zero) grazing especially in the high attitude.

(iv) Land in the zone has been cropped intensively for a long time and soils are virtually exhauseted, a problem of low yields has surfaced. On the basis of the above facts of the smallholder farmer in the zone experiments were planned that gave priority in solving the farmers constraints, and yet further the activities of commodity research work on mazie and beans.

In this zone experimentations were started in the season 1985/86 season.

The experiments designed for Moshi were:

(a) Paired Rows of Maize in Association with Beans
(b) Maize/Beans Density Fertilizer Trial
(c) Maize Variety Evaluation
(d) Weed Control Trial
(e) Maize/Crotolaria Rotation Cropping.

(1) Paired rows of maize in association with bean

Objectives:- to investigate the combined maize/ beanyield achievement using single row and paired row inter-cropping patterns, to determine the economic advantage of the bean growing system against farmers practice, to determine the labour and requirement of different patterns of intercropping.

This experiment was designed for the intermediate zone of Moshi, it aimed at increasing food yield by optimizing plant population in intercropped maize/legume crop. The results of this trial which is in its third year indicate that the

paired rows of maize intercropped with Lyamungo 85 bean gives high result compared to the traditional practice of haphazard planting intercropping with local bean varieties.

The farmers interviewed on this trial confirm this success. Maize yields per acre are 20-25 bags (90 kgs) per acre as compared to 10-12 bags obtained from a farmer practice plot.

(2) Maize/Bean density x Fertilizer Trial

Objectives: to study the performance and acceptance of the selected density x fertilizer treatment combinations under farmers practice.

This experiment was addressed to determining the best combination of maize/bean incorporating fertilizer to increase farmer income - hence complementing above experiment.

Again the trial has promising results.

(3) Maize Varietal Evaluation

This experiment was directed to the lowland villages of Moshi, which are granaries for the people in the high attitude. Despite this importance these areas have low rainfall, hence the trial was to determine which variety suits the area.

Objective: to look for the most suitable maize variety for both the environment and farmer opinion in lowland plain.

The results of this experiment which were concluded this year, indicate that farmers prefer the varieties MH41 Tuxpeno and Kilima and less so Kito. The latter matures early but has small cobs and seeds and has low commercial value. Nonetheless Kito is regarded as a guard against hunger in case of unreliable rainfall.

(4) Weed Control Trial

Objective: to find a more economic method of weed control for sole cropped maize in Moshi district, to evaluate farmer acceptance of herbicides for the control of weeds. The trial is also being carried out in the lowland areas of Moshi.

This trial was initiated to see if the use of herbicides can ease the labour problem of the farmer which indeed is quite vexing during the cropping season.

Farmers interviewed in the area concceded that the use of herbicides in their shambas doubles the yield from the hand weeded plot yields of 10-12 bags/acre. This technology seems to be gaining popularity fast.

(5) Maize/Crotolaria Rotation Cropping

Objective: to quantify short and long term maize nutritional benefits resulting from the use of Crotolaria as an organic manure, to determine the rate of replacement with commonly used N fertilizers.

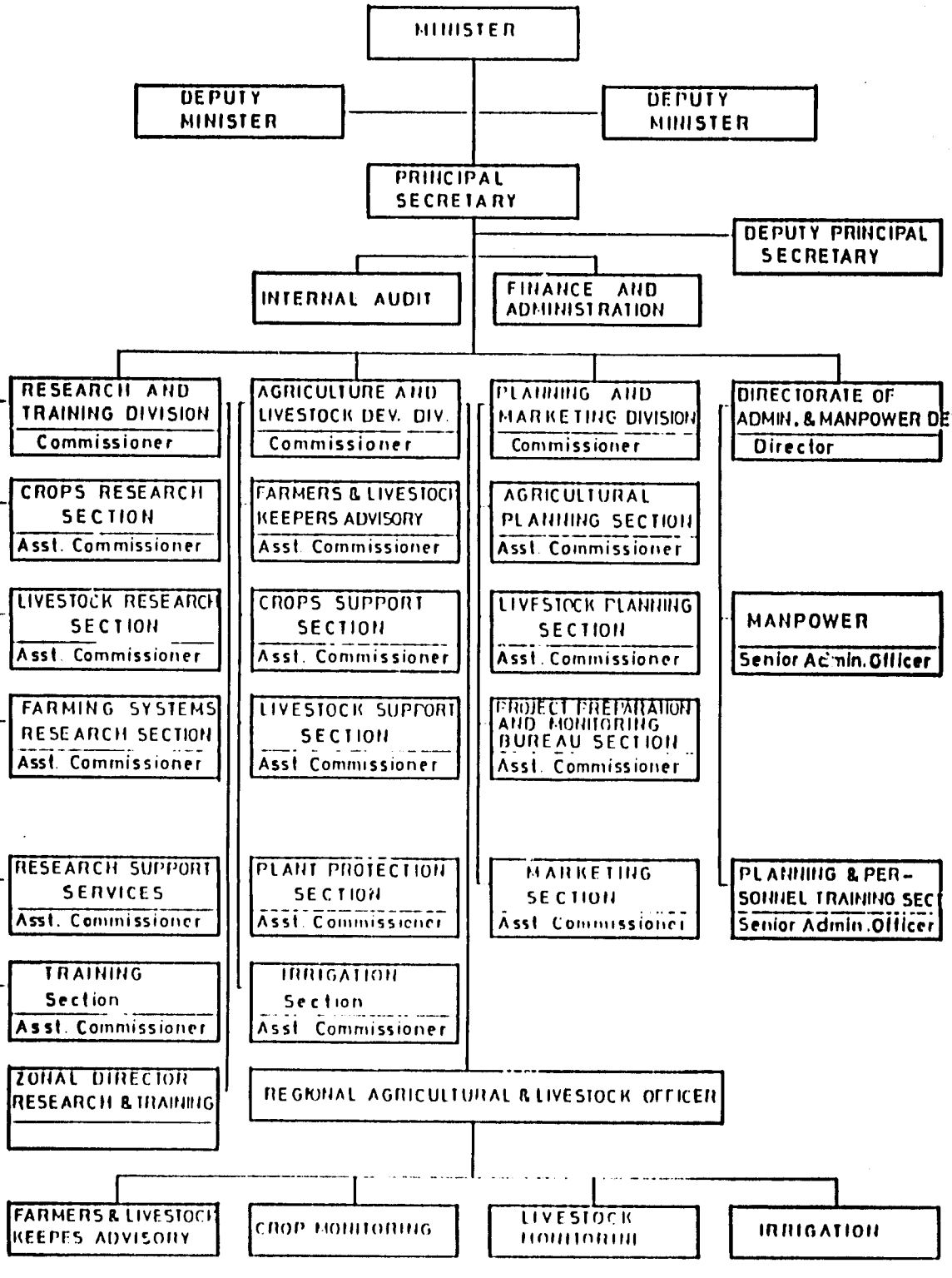
This experiment was dropped because of poor performance and low funding.

(6) Moisture Conseervation Trial

Objective: to study the effectiveness of open and tied ridges in conserving moisture for maize.

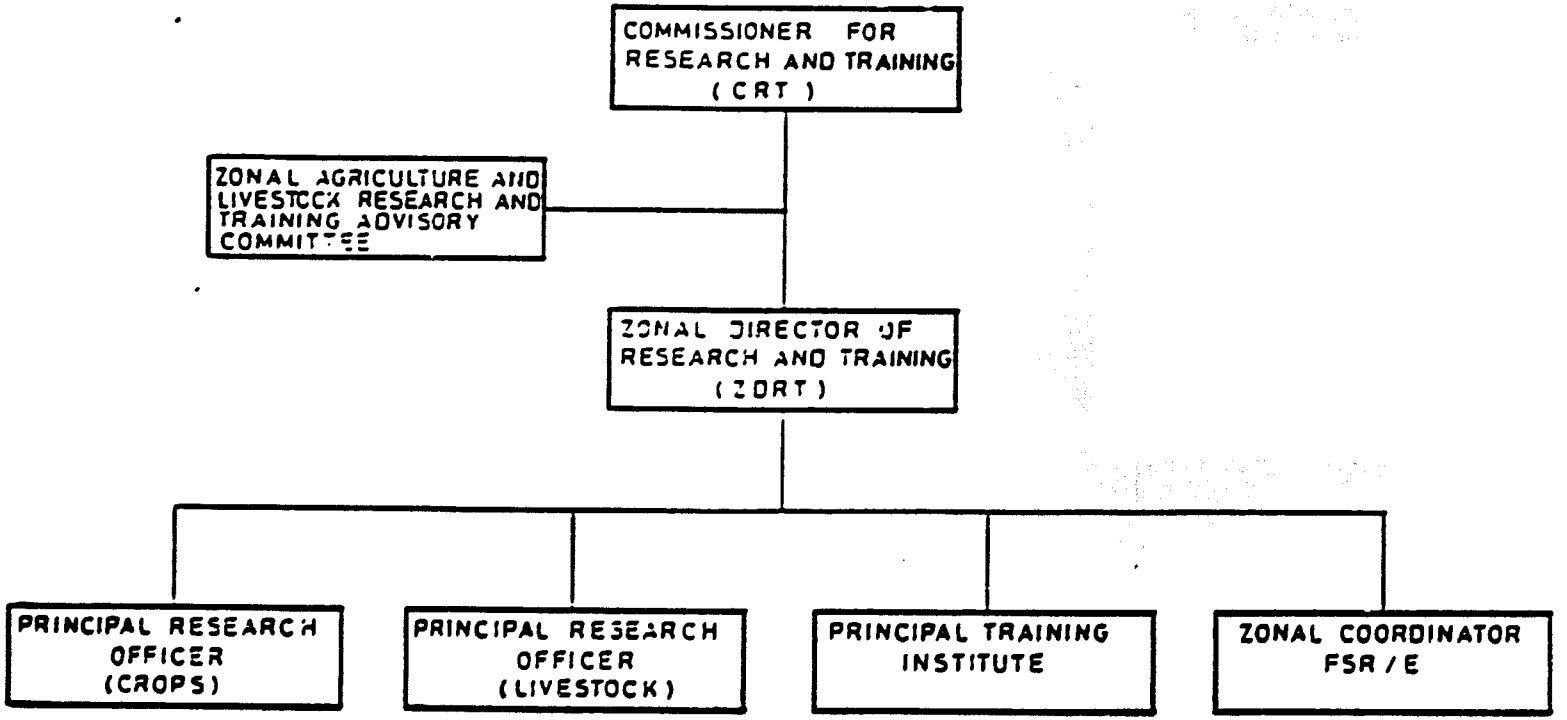
This was a non-station trial. It was dropped because of vermin and funding constraints

NEW ORGANISATION STRUCTURE FOR THE MINISTRY OF AGRICULTURE AND LIVESTOCK DEVELOPMENT



Note: Un official Translation of Swahili Version

PROPOSED ORGANIZATIONAL STRUCTURE OF ZONAL RESEARCH AND TRAINING CENTRES.



LAND DEVELOPMENT

EARTH MOVING MACHINES AND EQUIPMENT RECEIVED IN 1980/81

S/No.	Type of Machine or Equipment	Present Condition
1.	Land Rover P/U - 1	Poor
2.	Dump Truck 25T - 1	Irrepairable
3.	Dump Truck 5T - 1	Very poor
4.	Dump Truck 5T - 1	Very poor
5.	Dump Truck 2.5T- 1	Irrepairable (out of use)
6.	Truck tractor 5T-1	Out of use
7.	Truck tractor wrecker 5T-1	Fair
8.	Loader Scoop - (11-90cm)	Poor
9.	Fork lift - 1	Poor
10.	Tractor back hoe loader -1	Out of use
11.	Lowloader trailer 20T - 1	Good
12.	Semi-trailer 18T - 1	Good
13.	Road roller (motorized)-1	Fair
14.	Lube service unit - 1	Fair
15.	Truck shop equipment - 1	Poor
16.	Direct drive 3Hp centrifugal pumps - 3	Poor
17.	Cat. grade 12E-1	Fair (need repair)
18.	Cat. D5 - 1	Fair
19.	Cat. D7 - 1	Fair
20.	Hydraulic scraper - 2	Good
21.	Towed sheep foot roller -1	Good
22.	Concrete mixer - 1	Irrepairable
23.	Rome disc plow - 1	Good
24.	Ripper for D7 - 1	Good
25.	Gate valve 6" - 35	Good
26.	Gate valve 4" - 10	Good
27.	Valves non return 4" - 6	Good
28.	Valves non return 6" - 1	Good
29.	Land leveller - 1	Good
30.	Scraper 7 cu ft. - 1	Good
31.	Water tankers 700,400 4000 gall.	Good
32.	MF Tractors 2675 100Hp - 2	Very good
33.	Backhoe loader 60HP MF 60 - 1	Very good
34.	Motorbikes Honda C90-6-1	Out of use
35.	Marvin land plane 30 ft. -1	Good
36.	J.D. Tractor engine centrifugal pumps - 2	Good

37.	Chain tape - 4	Fair
38.	Fence strechers - 2	Good
39.	Automatic level - 1	Stolen
40.	Engineers Rod - 1	Good
41.	Texas calculator - 1	Out of use
42.	Barbed wire rolls - 900	
	Chain link fence rolls - 37	Usable
43.	Irrigation equipments	Good

SUMMARY OF PHYSICAL PERFORMANCE ON LAND DEVELOPMENT AT ILONGA

Project Component	Weight In %	For the whole Project	Achievement to Date	%	Balance to be
(A) Land Levelling	22	200ha	54Ha	5.95	146 Ha
(B) Roads and Drains	6	2800M	11,300M	2.42	167000M
(C) Drainage Structures	3	75	25	1.0	50
(D) Fence	6	10,000M	6,000M	2.4	4000M
Irrigation System (Construction and Layout)					
(i) Lake Ilonga					
(a) Dam Construction	30	165,000M^3	97,720M^3	17.8M^3	67,280
(b) Dam Riprapping (Stone)	2	3,040M^3	250$M3$	0.16	2,970$M3$
(c) Dam Sodding	2	12,150M^2	3,150$M2$	0.78	9,000$M2$
(d) Spillway construction (concrete)	2	10M	10M	2	NIL
(e) Bleaching Section, Contruction	2	50M	50M	2	NIL

(f) Spillway dran construction	4	650M	NIL	0.0	650M
(g) Intake Structues on Ilonga River	2				
Weigh Bridge Protection wall		800M^2	NIL		800M^2
Valve Chambezi Construction		2	2		NIL
(h) Concrete pipe laying two 15-in (Intake pipes)	3	350M	NIL	1.9	80M
(i) Intake open channel construction (lined)	3	350M	NIL	0	350M
(ii) Pump house construction	2	1.0 (4Mx4M)	0.5		0.5
(iii) Pipe laying (plastic)	5	48,200M	48,000M	4.98	200M
(iv) Service Reservor					
(a) Construction (15,300M^3 comp. soil)	4.6	317 Rect. Rin	317		NIL

(b)	Plastic Lining		4,160M^2	NIL	4.0	4,160M^2
(c)	Sodding		3,450M^2	3,450M^2		NIL
(f)	Electrif.	0.4	1,800M	NIL	0	1,800M
(g)	Project Adm.	1			0.5	
		100%			46.86% Say 47%	

Source: Status Report and Proposals to Accomplish the Land and Station Development Projects at Ilonga.
TARO-Ilonga, May 1988.

FACILITIES/EQUIPMENT

Following the termination of the project it appears most of the project office equipment remained at TARO headquarters and their present whereabouts not known. No proper inventory had been kept at Ilonga and Lyamungu regarding the expendable and non-expendable items purchased under the project. A number of equipment supplied at the head office also can't be traced, but there are some basic office furniture and equipments which are available and being used bythe research and training division of MALD. These include tables, file cabinets, chairs, book shelfs and computer.

Nobody was accountable in the MALD who could tell us exactly on the situation and transfer of these items.

The FSR/E were however able to tell us off-hand of some of the supplies/equipment pertaining to the project since its inception. The following are some of the items mentioned and their present condition.

VEHICLE/OFFICE/ FIELD EQUIPMENT	LOCATION	PRESENT CONDITION
1. Vehicle		
- 2 Landrovers	Ilonga & Lyamungu	All are out of order - not road-worth
- 1 Suzuki	Ilonga	Out of order - not roadworthy
- 12 Motorcycles	Ilonga & Lyamungu	Sold to FSR/E Staff
2. 3 Computers	Ilonga, Lyamungu & MALD	Come from TARO Head-quarters All not used, are out of date
3. Soil Testing/ Rain gauge Equipment	Ilonga	Not seen
4. Typewriters	Ilonga	Condition not veri-fied.

5.	2 Cameras	Ilonga & Lyamungu	Condition not verified.

No new supplies/equipment have ever been procured locally or abroad after termination of the project. In fact most of the FSR/E showed disappointment on the part of MALD for not replenishing some expendable and non expendable commodity items.

Appendix 3:H

MEAN YIELDS OF MASIKA MAIZE OBTAINED FROM RELAY CROPPING (tons/ha)

Masika Maize Variety	Vuli Planted Maize Variety		
	Early Maturing (Kito)	Late Maturing (Staha)	
Kito	0.90	0.64	0.77
Staha	2.76	1.36	2.06
EV8311B(TMV-1)[1]	3.34	1.50	2.42
ICW[2]	2.04	1.08	1.56
Mean	2.26	1.15	1.70

Source: FSR Project Final Technical Report, December 1986.

1 - Early Maturing Variety
2 - Late Maturing Variety

The table shows yields of masika planted maize as influenced by previous maize varieties planted in vuli season.

Higher yields are obtained when masika maize varieties are relayed with early maturing varieties rather than late maturing varieties planted in vuli season.

Appendix 3:I

CONTRIBUTION OF THE RELAY PLANTED MASIKA MAIZE TO THE FARMER'S ANNUAL MAIZE GRAIN STOCK 1985/86

Maize Yields (tons/ha

Location* (Villages)	Vuli[1]	Masika[2]	Total
Madoto	1.62	9.87	2.49
Madoto	1.17	0.82	1.99
Pea Pea	0.78	0.65	1.43
Pea Pea	0.98	0.77	1.75
Chanzuru	2.10	1.70	3.80
Mean	1.33	0.96	2.29

Source: TARO Crop Coordination Meeting Reports, (1985/86) Page 20.

1 - Mean yields of Kito and Staha varieties.
2 - Mean yields of Kito, Staha, TMV-1 and ICW varieties.

* - Two locations were used for each of Madoto and Pea Pea villages.

Appendix 3:J

GROSS MARGIN ESTIMATION; Maize and Cotton

	MAIZE VARIETIES			COTTON
	Kito	Staha	Traditional	
Yield (tons/ha)	2.22	2.93	1.00	2.67
Value (TShs)	19,980	26,370	9,000	59,674.5
Land preparation and planting	6,175	6,175	6,175	6,175
Thinning	-	-	-	1,482
Weeding	3,458	3,458	3,458	6,916
Insecticides	-	-	-	9,193.3
Batteries	-	-	-	1,580.8
Harvesting and haulage	2,620	3,458	1,180	7,706.4
Marketing	1,123	1,482	506	1,976
Uprooting & burning	-	-	-	1,482
Total costs	13,376	14,573	11,319	36,511.5
Gross Margins	6,604	11,797	(2,319)	23,163

*Price: Maize TShs 9.00/kg
Cotton TShs 22.35/kg.

RETURNS TO LABOUR; MAIZE VARIETIES

MAIZE (1 ha)

	Kito	Staha	Traditional	
			Before Project	After Project
Gross value	19,980	26,370	9,000	9,000
Less Total Cost	13,376	14,573	2,080*1	11,319
Gross Margin	6,604	11,797	6,920	(2,319)
Labour Input	111*2	111*2	89*2	89*2
Returns to Labour TShs/day)	59.5	106.3	77.8	(26.1)

*1 This is only the value of labour input and seeds - it is assumed that the farmer did not need to hire labour because rural-urban migration was not high as it is now - he used his family labour and did not hire tractor(s).

*2 These labour inputs were adopted from original project document-the farmers interviewed did not consistently remember how much labour input they put in. The small sample was not adequate to draw average labour input figures.

CITED LITERATURE

1. Publications List
Tanzania Farming Systems Project (1986)

2 A study of the Role of Extension in Farming Systems Research in Tanzania - D.G. Acker and D. Sungusia - 1985

3 A proposal for Tanzania Farming Systems Research and Extension Programme - D. Sungusia and Larry S. Lev - 1986.

4. Functional Structure for the Professional Component of Farmer/Professionals. Farming Systems Research and Development - M.T. Buchanan - 1985.

5. Tanzania Farming Systems Research - Project Paper - USAID - Washington - 1982.

6. Project Paper Supplement - Tanzania Farming Systems Project - USAID. Washington (1984).

7. Final Technical Report - Tanzania Farming Systems Project - D.G. Acker and L.S. Lev (1986).

8. Farming Systems Research and Extension Program Annual Report 1984/85 and 1983/84 - M.D. Mwanjali.

9. Tanzania Farming Systems Project Annual Report 1985 CID/OSU - 1986.

10. Report of Evaluation of the Tanzania Farming Systems Project and Related Activities - Land Development and Station Development at Ilonga - R.I. Jackson and D.D. Osburn (1986).

11. TARO crop coordinating committee Meeting Reports - Farming Systems Research (Central Zone) 1985/86 M.D. Mwanjali, L.C. Mushi, E. Hoya, J.A. Mamkwe and F. Nkamu (1986).

12. Farming Systems Central Zone Annual Report 1987/88 by: - M.D. Mwanjali, O.L. Ringia and W.L. Sumar.

13. Tanzania Farming Systems Project - 1983 Annual Report. CID/OSU (1984).

14. Farmer Training and Production Project - Evaluation Report MALD - (1984).

15. Status Report and Proposal To Accomplish The Land Station Development Projects At TARO - Ilonga.

16. The Kito Story - Tanzania Farming Systems Project. L.S. Lev (1985).

17. Farming Systems and Farming Systems Research in Tanzania- P. Anandajayasckaran, B.J. Ndunguru .J. Lupanga. University of Dar es Salaam. Faculty of Agriculture, Forestry and Veterinary Science - 1981.

18. Marketing of Farm and Non Farm Products in Kilosa District, Tanzania: A Reconnaissance Survey.I.J. Minde - SUA (1986)

19. Project Completions Report - Tanzania Farming Systems Project. W.A.Faught REDSO/ESA - (1986).

20. Role of Women in Farming Systems - A study by V.F. Malima MALD (1985).

21. Farming Systems Research Highlights 1983-1987. TARO (1988).

22. Tanzania Farming Systems: Lessons Learned D.G. Acker, J. Kearns and L.S. Lev, CID/OSU.1986.

23. Response to USAID Questionnaire on FSR Project Impact. L. Lev - OSU Telex message to Mr.J. Strauss USAID/Tanzania on 28/8/89.

24. The Agricultural Policy of Tanzania - MOA (1983).