THE ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN MOROGORO REGION: THE CASE OF THE NATIONAL SPECIAL PROGRAMME ON FOOD PRODUCTION [NSPFP] IN MANG'ULA DIVISION, KILOMBERO DISTRICT

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION OF THE SOKOINE UNIVERSITY

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ABSTRACT

The use of participatory approaches in rural development programmes is now becoming globally and locally advocated. In Tanzania, these approaches are believed to present an opportunity to smallholder farmers to participate in all stages of the agricultural programmes for sustainable agricultural production. Using NSPFP as a case study, the role of participatory approaches in smallholder rice production in Morogoro Region was studied.

The overall objective of the study was to examine the extent to which NSPFP participatory approaches have contributed towards increased adoption of rice technologies and yields amongst smallholder rice farmers in Mang'ula Division, Kilombero District. The study focused on three specific objectives:

1) To identify the improved rice technologies and practices that smallholder rice farmers (PFG and non-PFG members) have adopted as a result of the use of NSPFP participatory approaches.
2) To assess the effect of adoption on increased rice yields among smallholder rice farmers due to NSPFP participatory approaches.
3) To assess the attitudes of key actors with respect to contacts to address smallholder rice farmers production constraints.

The population for the study was all smallholder farmers in Mang'ula Division and the sampling frame was purposively determined to be smallholder rice farmers in the three villages (Mang'ula'A, Ichonde and Kisawasawa) in Mang'ula Division where NSPFP activities are concentrated.

The cross-sectional research design and stratified random sampling technique was used to establish the strata of respondents interviewed. All PFG members formed one stratum while non-PFG members formed the other. The purposive sub-sample of 75 PFG members determined the other sub-sample of 75 non-PFG members, thus making a sample size of 150 respondents interviewed. All the extension staff and some key informants were also interviewed to get information pertinent to the study objectives. Structured interview schedules were used to collect data from the PFG and non- PFG members, whereas semi-structured interview schedules were used to collect data from extension staff and key informants.

The results of the study show that the relationship between the increase in adoption of rice technologies and yields was not statistically significant for PFG and non- PFG members. A significant difference was observed in terms of programme contact to respondents. NSPFP contacted more respondents than other agricultural extension programmes due to use of PFGs as the organizational structures that facilitated the use of the selected participatory approaches (i.e.PFGMs, DFs, FFDs, GDFs and Workshops or Seminars). The results revealed that while the DFs were used as demonstration centres of the selected rice innovations, the trained GDFs were used as consultants of PFG and non- PFG members on the selected and demonstrated rice innovations on need basis to complement efforts of VEOs at the grassroots level.

From the results of the study, FFDs were used as the places for the key actors to verify the potential of using rice innovations and become aware of their working

relationship. The statistical analysis showed that, there was a highly significant difference between PFG and non-PFG members on the purposes of interacting together to learn and select the improved rice technologies, discuss on availability of agricultural inputs and verify the potential of using rice innovations.

The study recommends formation of more PFGs as the organizational structures that would facilitate the use of participatory approaches, establishment of linkages with agricultural support services and interaction among the key actors in agricultural production.

DECLARATION

I, RAPHAEL KIVOYAN LOISHIRO LAIZER, hereby declare to the Senate of SOKOINE UNIVERSITY of AGRICULTURE that this dissertation is my own original work and it has not been submitted, in whole or in part for a degree award at any other University.

Signature..... Date ..14/11/99.....

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DEDICATION

This dissertation is dedicated to the memory of my beloved late father KIVOYAN LOISHIRO and son SAITOTI RAPHAEL. May ALMIGHTY rest their souls in peace; Amen. To my mother NASINYARI KIVOYAN, who reinforced the foundation of my education laid hitherto.

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ACRONYMS

ANOVA	Analysis of Variance
CRDB (1996) LTD	Cooperative and Rural Development Bank (1996) Limited
DALDO	District Agricultural and Livestock Development Officer
DAO	District Action Officer NSPFP
DC	District Commissioner
DFs	Demonstration Farms
DIVEO	Divisional Extension Officer
DS	Divisional Secretary
DW	Ward Councillor
ES	Extension Staff
Freq.	Frequency
FAO	Food and Agriculture Organisation of the United Nations
FFDs	Farmers Field Days
GDFs	Group Demonstration Farmers
Ha	Hectare
HYV	High Yielding Varieties
IS	Input Supplier
KATC	Kilimanjaro Agricultural Training Centre
MAC	Ministry of Agriculture and Cooperatives
MP	Member of Parliament
NAEP	National Agricultural Extension Programme
NAITF	National Agricultural Inputs Trust Fund

NALERP	National Agricultural and Livestock Extension Rehabilitation Project
NMB LTD	National Microfinance Bank Limited
NS	Not Significant
NSPFP	National Special Programme on Food Production
NGOs	Non-Governmental Organizations
PFGs	Participatory Farmers Groups
PFGMs	Participatory Farmers Group Meetings
PNP	Plant Nutrition Programme
RS	Research Staff
SEP	Sokoine Extension Project
SUA	Sokoine University of Agriculture
SPSS	Statistical Package for Social Sciences
TAZARA	Tanzania-Zambia Railways Authority
UMHODEP	Upper Mgeta Horticultural Development Project
UMNP	Udzungwa Mountains National Park
URT	United Republic of Tanzania
VEO	Village Extension Officer

CHAPTER ONE

INTRODUCTION

1.1 Background Information

In Tanzania, agriculture is the backbone of the economy that relies on smallholder farmers to produce more than 90% of the food supplies, generate income and employment for 80% of the population and earn the country about 75% of the much-valued foreign exchange (Amani, 1992). The smallholder farmers hardly use improved agricultural technologies and practices in agricultural production. In addition, the smallholder farmers have limited contacts with extension services, research centres, policy makers and the private sector, the important partners in agricultural production. Many criticisms on the extension service have been made by extension professionals especially for its inadequate contact with the majority of smallholder farmers (Mattee and Mollel, 1990). Infact, smallholder farmers need information, new technologies and practices developed by research centres to improve their agricultural production. Recently, however, it has been observed that agricultural development across Tanzania is rapidly changing and the change is easily noted among others in (1) the formulation of new policies and creation of new organizations for agricultural development and (2) the inculcation of more positive attitudes towards the value and applicability of research findings in smallholder farmers environment. There is also an increased effort to seek greater involvement of smallholder farmers in all stages of the agricultural development process through the use of participatory approaches (Keregero, 1988).

Gilbert *et al* (1980), noted that increased participation and involvement of smallholder farmers in the process of technology development and transfer, at all possible levels, led to effective problem solving in all dimensions, eg. social, economic, institutional and ecological. It is in this context that the Government of Tanzania and the Food and Agriculture Organization of the United Nations (FAO) have made an attempt, from 1994, to utilize participatory approaches to facilitate agricultural production at the grassroots level. As an intervention to stem the food deficit problem, the National Special Programme on Food Production in Support of Food Security (NSPFP) was conceived in Tanzania in 1995 to complement the extension services in place.

1.2 National Special Programme on Food Production (NSPFP)

NSPFP is an intervention which is considered by the Government of Tanzania to have the potential to improve the existing precarious food situation in the country. The main focus is on two strategic staples, maize and rice due to their high preference and demand locally, and in neighbouring countries, good keeping qualities, easy storage and transportation. NSPFP is being implemented within the overall framework of Tanzania National Food Security Programme which is a blueprint for all food security, production and management-related initiatives. The main objective of the NSPFP is to rapidly increase food crop production and farm productivity in a sustainable way in order to reduce the prevailing wide gap between food demand and supply. An important and a closely related objective of NSPFP is to show through an approach based on participatory field demonstrations how (a)

barriers to widespread adoption of available improved agricultural technologies can be clearly identified and agreed upon by all concerned actors, and (b) a sound programme of policy reform, investment and capacity building can be designed for their removal. This is achieved through the formed and consolidated participatory farmer's groups (PFGS) which have recognized members who grow either maize or rice, selected leaders, established group constitution and a level of savings at the National Microfinance Bank Limited (NMB Ltd) or Cooperative and Rural Development Bank(1996) Limited (CRDB(1996)Ltd). The PFGS are also registered as legal economic entities under the Societies Ordinance of 1954 with the Ministry of Home Affairs. The NSPFP is operating in two Regions of Tanzania Mainland, Morogoro and Dodoma. The Regions were chosen for their potential in increasing maize and rice production, accessibility of markets for inputs and disposal of farm products, potential of farmers participation and availability of research and extension services. In Morogoro Region, the programme is in two Districts, Kilombero and Morogoro Rural. Within Kilombero District, NSPFP is operating in two Divisions, Ifakara and Mang'ula where 21 PFGs (18 for rice and 3 for maize) with 305 participating farmers were formed and consolidated.The demonstration farm (belonging to one of the group members) for each group is used as a demonstration centre of selected improved agricultural technologies and practices to other PFG members (those smallholder farmers who are group members and participate directly in the programme activities). PFG members come to the demonstration centre, learn the technologies and thereafter practice what they learned in their own farms. The PFG members, research and extension staff selected the improved rice technologies

and practices which were demonstrated by the trained demonstration farmers to realize their potential.

NSPFP relies on participatory approaches (organized farm demonstrations, farmers' field days, workshops and seminars, PFG meetings and trained demonstration farmers) to facilitate participation and continuous dialogue amongst key actors (farmers, extension and research staff, input suppliers and policy makers). According to the programme, participation means involvement of key actors at the onset, from programme planning, implementation, monitoring and evaluation in order to bring in their commitment and resource contribution towards sustainable food crop production (FAO,1990). This is achieved through collective identification, assessment and analysis of food crop production constraints at all levels. Farm demonstrations are used by NSPFP as an entry point for identifying the action necessary to remove the constraints and facilitate widespread adoption of the selected improved rice technologies and practices. The organized farmers' field days are opportunities for PFG members, non-PFG members (those smallholder farmers who are not group members and who do not participate directly in the programme activities), research and extension staff, private sector and policy makers to see the potential benefits of the demonstrated agricultural innovations. In addition, PFG meetings and trained demonstration farmers promote active participation of other PFG members in dissemination and adoption of improved rice technologies for increased rice production.

1.3 Problem Statement

Within the framework of participatory approaches that NSPFP uses, some existing and missing linkages have been identified, strengthened and established in order to link the smallholder farmers with other support services for higher agricultural production. To a certain extent, this goal is achieved by NSPFP. For example, the smallholder farmers under the programme have dramatically improved their rice yields from 2.6 to 5.6 tons per hectare and have access to improved agricultural technologies, credit facilities and constant discussions with other relevant partners (like NGOs, policy makers, input supplies, research staff) on their food production problems (Mero, 1997 Unpublished Paper). However, there are three issues which are still unclear.

(1) What are the improved rice technologies and practices that smallholder rice farmers have adopted as a result of NSPFP in Mang'ula Division?

(2) What is the effect of adoption on increased rice yields amongst the smallholder rice farmers due to NSPFP participatory approaches in Mang'ula Division?

(3) How is the attitude of key actors with respect to contacts to address the critical problems (institutional, ecological or socio-economic) that constrained adoption of rice technologies and yields in Mang'ula Division?

1.4 Justification of the Study

Emphasis on participatory approaches in agricultural extension in Tanzania is on the increase these days especially in connection with smallholder agricultural development (Achimpota and Rugalema, 1992). Although there is a dilemma in trying to understand and interpret people participation among rural facilitators, one common agreement has emerged. Participatory approaches is seen as an effort to empower the smallholder farmers and improve the extension services which are largely confined to public domain and disregard the centrality of farmers' indigenous knowledge gathered over their lifetime (Danda, 1997 Unpublished paper). It is believed that participatory approaches have grown out of the frustrations with conventional extension approaches which inhibit active participation of smallholder farmers (Rutatora, 1992;Keregero,1989).The extent of active participation of the key actors in the selection and dissemination of improved rice technologies and practices under NSPFP in Kilombero District is still unknown. The findings of the study will give more insight on the effect of participatory approaches with regard to agricultural production and will provide the basis for suggesting other rural development interventions. The contribution of NSPFP participatory approaches in smallholder rice production in Mang'ula Division will be useful to policy makers, implementing teams and others concerned with rural development to adjust and redirect the extension approaches to enhance active participation of the key actors, a pre-condition to agricultural development.

1.5 Objectives of the Study

1.5.1 Overall objective

The overall objective of the study was to examine the extent to which NSPFP participatory approaches have contributed towards increased rice production through the dissemination of selected improved agricultural technologies amongst smallholder farmers in Mang'ula Division.

1.5.2 Specific objectives

(1) To identify improved rice technologies and practices that smallholder rice farmers (PFG and non-PFG members) have adopted in Mang'ula Division as a result of the use of NSPFP participatory approaches

(2) To assess the effect of adoption on increased rice yields among smallholder rice farmers due to NSPFP participatory approaches

(3) To assess the attitudes of key actors with respect to contacts to address smallholder rice farmers production constraints.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1 Introduction

This chapter reviews some of the available literature on participatory approaches used by various rural development agencies as strategies to involve the target groups at different stages of the development programmes. The Chapter is divided into three sections. The first section covers the development, transfer and utilization of agricultural innovations. While the second section reviews on participatory approaches in agricultural extension, and the last section reviews on the interplay of key actors in participatory approaches.

2.2 Development, Transfer and Utilization of Agricultural Innovations

In the 1960's and 1970's rural development approaches tended to be rather top-down and based on delivering technical solutions to the farmers without considering their needs, aspirations and priorities (FAO, 1995). The solutions were usually technically sound, developed by agricultural research, but very often they didn't fit the farmer's requirements or abilities. The developed technologies were incompatible with the socio- economic context of the farmer and hence were not adopted. In the 1980's and 1990's increasing efforts have been made by rural development agencies to seek greater involvement of target groups in all stages of development programmes (Abdalah, 1991). In this case,innovations are derived from the beneficiaries, the field staff serve as brokers to obtain additional scientific assistance confirming advantages and identifying application domains.

Studies on irrigation development in Asia have found that unless farmers are involved from the very start it will be difficult to obtain their subsequent participation (Moris, 1991). It is recommended that the extension agents see themselves as working with, rather than for, farmers and that potential clients are involved from the onset of programme planning. Generally, farmers are hard to convince by words they need practical demonstrations which will stimulate them to try out innovations themselves (Van Den Ban and Hawkins, 1996). Through demonstrations, farmers can see causes of problems and possible solutions. Therefore if the extension agents really want to get their messages across to farmers, they ought to be practically oriented. For effective use of agricultural innovations one has to ask the farmers the kind of information they need (Wambura, 1993). In this way, the extension agent will gain the farmers confidence by offering them relevant, reliable and usable technologies. Through the extension service, the farmers are assisted to improve their organization and leadership skills so that they can effectively articulate their problems and needs (Swanson, 1984).

In addition, farmers organizations will also facilitate smallholder farmers participation in the selection and dissemination process of agricultural innovations (Oakley, 1990). Farmers organizations are vital mechanisms by which the smallholder farmers can be involved in agricultural development activities. Ghai (1988), observed that organized farmer's groups constitute appropriate structures for launching ownership, management and operation of agricultural programmes. In this way, the recognition of smallholder farmer's contribution in the development of agriculture will be promoted by putting them in the centre in designing,

implementing, monitoring and evaluating the agricultural programmes.

While it is important to recognize the contribution of smallholder farmers towards the success of the agricultural programmes it is even more significant to identify the factors which inhibit their active participation. Nanai (1993) identified age, gender, marital status, education, farm size and labour as factors affecting participation of the target group in HESAWA activities.

2.2.1 Participation in relation to age

It has been observed that young people are less conservative than their elders and hence are more likely to participate in agricultural programmes (Maunder, 1973 p 48). Nanai also noted that, there is an increase in the level of participation with age to the optimum age group, after which participation starts to decline with increase in age. The age between 25-34 years has proved to be more venturesome, active and ready to try out innovations. The age above 34 years are pre-occupied with home and community based obligations. It is thus advisable for extension agents to concentrate more on this group while attention is also given to other age groups.

2.2.2 Participation in relation to gender

Haverkort (1991) conducted study related to participatory technology development in Eastern Indonesia. The findings showed that the majority of rural population mainly women face special obstacles which prevent them form participating in rural development programmes. Heavy labour demands, prevailing cultural restrictions like not speaking at open meetings, inferiority of women's work and interests,

patriachal culture reinforced by the colonial ideologies of the peasants household are some of the obstacles.

Mngodo et al (1996) observed a more or less similar situation in sub-Saharan Africa and in particular Tanzania where men and women have double and triple roles respectively. Men are involved in productive and managerial roles while women are involved in productive, reproductive and managerial roles. Men generally have greater opportunities to participate in agricultural programmes than women due to their somewhat lighter workload in the communities.

2.2.3 Participation in relation to education

Poor and less educated people generally lack confidence in their ability to improve their lives (Levinger and Drahman, 198). The smallholder farmers are supposed to be put in a position where they could analyze their situations (get a clear image), and design ways of rectifying such situation. Nanai (1993) found that the people's level of education has positive relationship with the level of participation. This suggests that, if the farmers' level of understanding is improved, participation will be enhanced. The extension programmes therefore should try to educate and enhance farmers' confidence in order to win their participation.

2.2.4 Participation in relation to marital status

Inspite of women being key contributors to agricultural production, they have been constantly marginalized by agricultural development programmes (Wiley, 1984). Overholt et al (1984) noted that married women are rarely involved on the

elaboration of policies or consulted when new farming technologies are introduced even though these are of direct concern to them. The reason for this inadequate participation is that married women lack the necessary resources like land and credit, dicision making and agricultural information. Whatever agricultural information that exists in the villages, is passed on to husbands, not to neither wives nor single women who are busy working on the fields, households chores and other community obligations.

While Shayo (1991) observed husbands and neighbours to be the womens' main source of information rather than extension agents, Koda (1994) revealed that wives remained the implementors of decisions made by husbands due to their limited participation in politics, development programmes and public life. However, the effectiveness of husbands as source of information have been questioned by Van den Ban and Hawkins (1996) who observed that the trickle down of information from husbands to wives have been shown to be impracticable. The improvement of the status of women in rural development is a key factor and most effective way to promote agricultural production in the household and nation at large.

2.2.5 Participation in relation to farm labour

In Tanzania, it is estimated that on average, women provide 60% of all the labour force in agriculture (Koda, 1994). This means that females contribute more to agricultural production than males. Mbago (1997) observed women to spent a mean of 8.5h/day and men 7.4h/day in agricultural work during the farming season. While Wagao (1991) noted adults and children of a specific household to perform many field operations, Ashimogo (1995) observed reliance on family labour for farm work

to predominate in most households. However, labour hiring in and out of the household is noticed to be a common phenomenon especially in peak labour demand operations like weeding and harvesting.

2.2.6 Participation in relation to farm size

Land fragmentation is very common in most parts of Tanzania. The smallholder farmer cultivates an average of two hectares located about three kilometres on average away from the household (Gabagambi, 1998). The cultivated land size of most households is too small for household needs and the rudimentary tools used for agricultural operations further worsen the situation. The majority of smallholder farmers use bicycles or walking and there are cases where farmers shift temporarily to stay in the fields to avoid commuting everyday (Lazaro, 1996). This has a negative effect on adoption of improved agricultural technologies and practices.

2.2.7 Adoption of agricultural innovations

The interest of most extension agents and other rural facilitators is on how the adoption of the recommended technical packages could be accelerated. The potential users of the innovations and the change agents form the basis of the diffusion process to the entire community. On the one hand, Van den Ban and Hawkins (1996) observed that extension agents often will be more effective in diffusing the innovations when they base their strategies and methods on adoption and diffusion of recommended technologies. On the other, studies by Morrison et al (1984), and Rogers (1995), indicated the characteristics of innovations to be very important in adoption.

However, there are many situations in which all farmers can not be expected to adopt an innovation since the decision to adopt depend on their resources and personal values. Sofranko (1984) singled out personal values as important elements in the change process and assumed to be crucial in influencing farmers goals and behaviour. The smallholder farmers' behaviour (earliness or lateness of adoption) can be used to classify farmers into adopter categories i.e innovators, early adopters, early majority, late majority and laggards (Fliegel, 1984). The classification of farmers into these adopter categories depends on the degree to which the whole group has adopted the innovations and on the assumption that distribution of adoption overtime is normal.

2.3 Participatory Approaches in Agricultural Extension

In general, participatory approaches in agricultural extension form part of the current issues in extension education. The central elements in participatory approaches are active participation and involvement of smallholder farmers in the three crucial stages: assessment, analysis and action (Temu and Due, 1996).The facilitator under participatory approaches strives to help farmers to resolve information by joining with them in translating information and in selecting what to use (Ibrahim, 1992). The extension officers, therefore, have to ensure that they consider the information in relation to the context of the individual farmer needs. For example, the NSPFP philosophy of participatory approach is that PFG members together with their facilitators begin with a problem posing session. They work together to identify, analyse and solve a problem of mutual concern with regard to rice production.

The process leads the group to better understand the problem at stake and to question their underlying causes. Participatory approaches prove useful under such circumstances as they provide opportunities for the farmers, extension and research staff to learn together and build up technical packages together. Perhaps the greatest contribution that the extension agents can make is to help the farmers regain their confidence in themselves and their abilities to fight their way up from poverty and unprofitable technical packages (Burkey, 1996). The anticipated output from NSPFP is development of feasible and appropriate technical package that will be utilized by the smallholder farmers in order to improve their agricultural production on a sustainable basis (Mero, 1995 Unpublished Paper).

The success of developing feasible and usable technical packages in developing countries like Tanzania will therefore depend on the degree to which the key actors of agricultural development are involved in developing these packages. Sofranko (1984), suggested different ways of securing peoples participation and involvement in various programmes, among them being through recognizing and encouraging them to express their problems, needs, aspirations and interests which will be considered in the programme planning. In this way, people will provide their input into the structure of the programme which will help to break the mentality of dependence, a common characteristic of many smallholder farmers. This will instil confidence on the part of smallholder farmers in examining their problems and think positively about solutions in order to make improvements in their lives (Oakley, 1991).

2.4 Interplay of Key Actors in Participatory Approaches

Agricultural development is a function of the interplay among the key actors and other factors like good farm prices, accessible markets and credit, developed infrastructure and processing facilities. Rolling (1988) and Adam (1982) regard these as the linked elements of the development "mix". The report by Lassale (1992) on Upper Mgeta Horticultural Development Project (UMHODEP) indicates that active participation of all these actors in farming activities will promote sustainable agricultural production. The absence of one or more in the production process may retard agricultural development. The farmers are naturally knowledgeable of the system in which they are operating. For example, they know what to sow at which season, who to ask for what when it comes to harvest time. On the other hand, facilitators have some new ideas to share with the farmers about their farming system for stimulating agricultural production e.g. developed agricultural technologies. The facilitator gives farmers room to participate in their own development through contacts with other relevant actors.

Mushi (1986), observed that farmers' contacts with other stakeholders in agricultural development can be facilitated by organized farmers associations which form a base to promote inter-change of actions and reactions. Agricultural development is inconceivable in the absence of farmer's associations. The working together of smallholder farmers with the related private and government institutions will lead to decisions and actions which are based on self confidence and determination (Ndulu, 1990).

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1 Introduction

The Chapter describes the methodology used during the research work. It includes description of the research area, research design, sampling procedure, development and administration of the instruments, data collection and statistical procedures used to analyse the data.

3.2 Description of the Research Area

The research work was confined to Mang'ula Division in Kilombero District, Morogoro Region. The Division has ten villages (Mkula, Sonjo, Mang'ula `A', Mang'ula `B', Mwaya, Mgudeni, Ichonde, Kisawasawa, Mkasu and Kiberege) with 11,801 people who are capable to work out of which 2,779 are from Mang'ula A, Kisawasawa and Ichonde where NSPFP is operating. The area is situated within the Kilombero Valley with a high potential for rice production. The TAZARA railway line and Mikumi-Ifakara road (60 km from the junction of Morogoro to Iringa road) cross the research area making it accessible throughout the year (Fig. 1). On the west is the Udzungwa Mountain National Park(UMNP) and to the east is the Selous Game Reserve. The area is also boardered by Kidatu Division to the north and Ifakara Division on the south (Fig.2).

The NSPFP pilot villages are crossed by three rivers namely Njookamwone, Ichonde and Kisawasawa. They originate from the Udzungwa Mountains

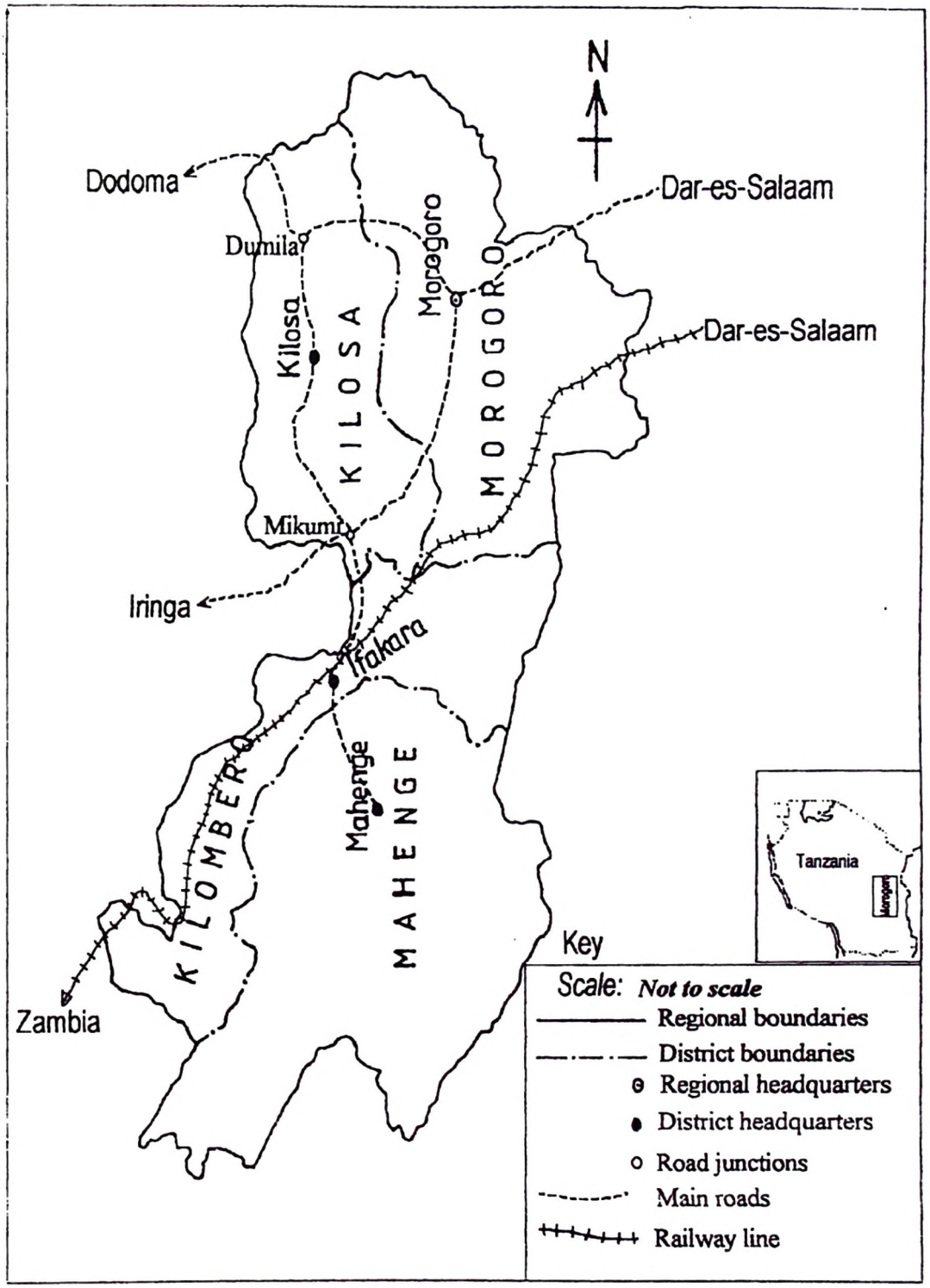

Fig. 1: Location of Kilombero District within Morogoro Region.
Source: Atlas of Tanzania, 1985.

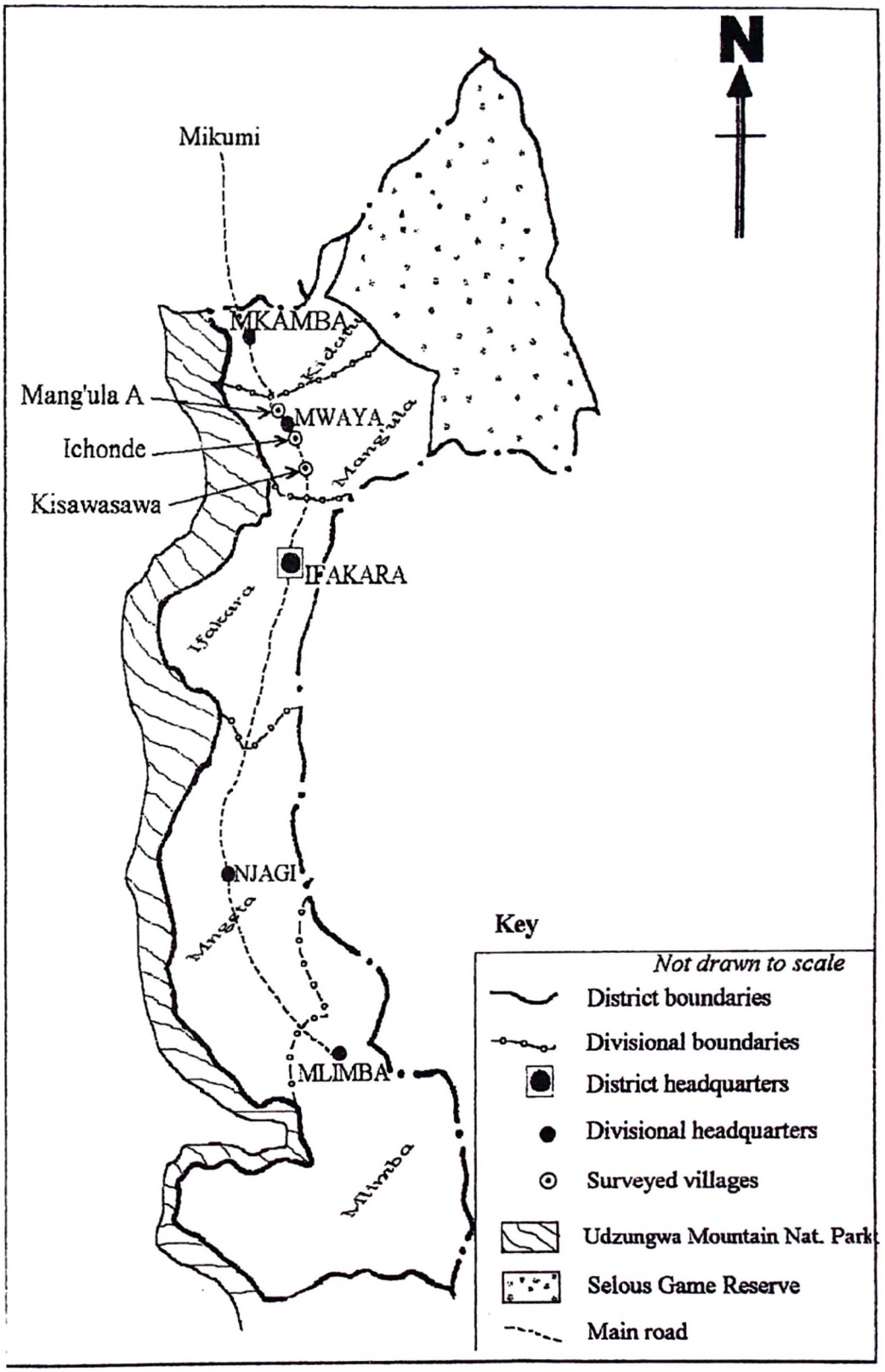

Fig. 2: Location of Surveyed Villages within Mang'ula Division in Kilombero District
Source: Atlas of Tanzania, 1985.

providing water for irrigation of rice farms and a source of fish to smallholder farmers in the area. The choice of the area was based on the fact that the area is inhabited by smallholder farmers who grow rice and maize as their main source of food and income. It is also in this Division where you find the six rice PFGs (which constituted the PFG members interviewed) and various activities of NSPFP which the researcher took as a case study.

3.3 Research Design

The study used a cross-sectional research design where data were collected at a single point in time from a selected number of respondents by use of interview schedules (Babbie, 1990). The data collected were used for descriptive purposes as well as for determination of relationships between and among variables.

3.4 Sampling Procedures

3.4.1 The survey population

The population for the research constituted all smallholder farmers in Mang'ula Division. All the extension staff and key informants working with the smallholder farmers in the area were also included in the research to solicit information related to the objectives of the research.

3.4.2 The sampling frame

The smallholder rice farmers in Mang'ula A, Ichonde and Kisawasawa were purposively selected to constitute the sampling frame. It is in these villages NSPFP

has been operating. A total of six PFGs (two in Mang'ula A, two in Ichonde, and two in Kisawasawa) were formed and consolidated by NSPFP. Using a stratified random sampling technique, two strata were established, namely all PFG and non-PFG members. These formed the basis of sampling units where the sample size was constituted.

3.4.3 Sample size

The researcher expected to interview all the PFG members from the six PFGs in the research area. Out of 87 anticipated PFG members only 75 were able to appear for interview. Twelve were unable to appear for interview because of various reasons. Some of the reasons were attending funeral ceremonies, health problems, attending court to give evidence, married in other villages (for young female farmers), on long safari, isolated by floods and prolonged rains due to EL-Nino, draining rain water from the paddy fields, and other household obligations like collecting firewood. Due to observed absenteeism of the PFG members, the new proportionate sub-sample for non-PFG members who were relatively many compared to PFG members was recalculated from each village. A total of 75 respondents were picked at random (26 from Mang'ula A, 23 from Ichonde and 26 from Kisawasawa). All the six extension staff and five key informants (policy makers, local leaders and input suppliers) working within the Division were also included in the research. A sample size of 161 respondents was obtained for data collection. The membership lists of PFG members and the village roster of non-PFG members in each village and the table of random numbers were used in picking the proportionate sub-sample of non-PFG

members.

3.5 Development and Administration of Instruments

3.5.1 Development of instruments

The interview schedules were developed in English with closed and open-ended questions to collect both qualitative and quantitative data. After development of the instruments, comments were sought from research scientists and other agricultural professionals.

Their comments and suggestions were incorporated into the interview schedules ready for pre-testing under field conditions. A village with similar characteristics (grow rice, composed of smallholder farmers and has NSPFP activities) like those of Mang'ula was used to pre-test the instruments to check for content validity especially for any ambiguities in the wording of items and time required for completing the interview. In this case, Hembeti in Morogoro District was chosen for pre-testing the instruments. A random sample of six smallholder rice farmers was picked from each stratum (PFG and non-PFG members). The VEO, DIVEO, Input Supplier and the Ward Councillor were also interviewed to represent extension staff and key informants respectively.

After field pre-testing, the researcher and his supervisor went through the completed interview schedules and found that no major changes in content or emphasis were necessary. They noted however, that wording of certain items was not clear and there was repetition of some items. The unclear items were modified and the repeated ones were deleted. It was also found advisable to change the order of

certain items so as to group together items that were closely related in emphasis. The final interview schedules were therefore developed and multiplied ready for actual interviews which were to be conducted at Mang'ula Division in Kilombero District.

3.5.2 Administration of instruments

The researcher introduced himself to the Divisional government by giving a letter of introduction from the Department of Agricultural Education and Extension of Sokoine University of Agriculture where the researcher is undertaking his studies. The letter showed the name of the student, the purpose of visiting Mang'ula, people to be involved in the interview and significance of the study.

The researcher had also an opportunity to countercheck the calculated figure for village active populations according to National Population Census of 1988 against the actual village active populations data available at the divisional office. The main purpose was to be sure of the actual proportionate sub-samples of non-PFG members to be picked at each village. There were slight variations noted between the calculated figures for active populations and those available at the Divisional office. The calculated figures were 827 for Mang'ula A, 944 for Ichonde and 1152 for Kisawasawa. The available figures at the Divisional office were 690 for Mang'ula A, 944 for Ichonde and 1145 for Kisawasawa. The available active population for Mang'ula A was found to be slightly lower than the calculated because of population out- migration caused by the close down of Mang'ula Saw Mills and the reduction of staff at Mang'ula Mechanical and Machine Tools Company Limited in early 1990's. The factories provided employment opportunities to villagers in the area

which to some extent improved their economic status.

By appointments, the researcher and DIVEO (host of the researcher while in the research area), visited Mang'ula A, Ichonde and Kisawasawa to familiarize themselves with the villages and also to meet the village and PFG leaders and VEO to confirm the availability of PFG members during the interview. With the help of village leaders (village secretaries and chairpersons) and VEOs, the proportionate sub-samples for non-PFG members were picked in each village. The confirmed figures of PFG members in each village were used to recalculate the sub-samples of non-PFG members.

Due to research budget cutbacks from the sponsor, the researcher could not personally administer the semi-structured interview schedules to extension staff and key informants. Instead, the semi-structured interview schedules were mailed to them to fill and mail back to the researcher. The spatial distribution of the respondents (some are in Ifakara and others are in Mang'ula) aggravated the possibility of the researcher carrying out the activity himself.

3.5.3 The interview process

Before the actual interviews, the researcher trained the VEOs on how to administer the interview schedules in order to assist during the exercise. By appointments and at the agreed place and time, the researcher interviewed all the PFG members while the VEOs interviewed their respective non-PFG members. Most interviews for PFG members took place in the group chairpersons' residences and nearby primary schools during the weekends when the pupils were at home. The interviews for non-

PFG members took place around their residences, except for a few who (for one reason or another) preferred to be interviewed at the political party branch offices (this refers to those respondents who were close to the party branch offices). All the interviews were conducted in a relaxed informal fashion where the respondents gave information openly and tried to be helpful and informative. During the interviews, privacy was observed to give more freedom to respondents to express themselves.

3.5.4 The recording process

All the interviews were conducted in Kiswahili the common language for both enumerators and respondents. The enumerators had the task of jotting down all the information provided by the respondents.

After every interview, the enumerators inspected the recording of each interview immediately after it was completed before proceeding to another respondent. The aim was to check for proper recording and wording of information. After completion of the interview process with PFG and non-PFG members, the researcher took some of his time to inspect all the completed interview schedules to check for proper recording of information.

The researcher also collected the already filled semi-structured interview schedules mailed to VEOs and key informants at Mang'ula and Ifakara before leaving for Sokoine University of Agriculture(SUA). The experience shows that obtaining responses to mailed qoestionnaries took a long time and needed some reminding letters from the researcher. However, all of them were successfully collected except for Member of Parliament (MP) and District Commissioner (DC). The MP was

attending the Parliamentary Session in Dodoma and the DC was visiting the floods-affected villages at Kidatu Division.

3.6 Data Collection and Analysis

3.6.1 Data collection

Two types of data were collected, primary and secondary data. The structured interview schedule and semi-structured interview schedule were used to collect the primary data from the respondents. For the purpose of this study, the interview schedules were used for PFG and non-PFG members, whereas semi-structured interview schedules were used for extension staff and key informants. The primary data were mainly respondents characteristics (age, gender, level of education, group membership, marital status, main food crops grown and crop farm size), type of courses attended, rice yields, adopted and rejected improved rice technologies and practices, the effect of adoption on increased rice yields and the attitudes of key actors with respect to working together to address the farmers rice production constraints.

The secondary data were obtained from NSPFP office at the Ministry of Agriculture and Cooperatives (MAC) and FAO in Dar es Salaam, Regional and District Agricultural Offices, especially using the reports prepared for NSPFP seminars and workshops. Some of the minutes of the village and PFGS meetings were also reviewed to collect relevant information. These included, the agenda of the meetings, participants in the meetings, the approaches used in problem solving and the

resolutions reached during the meeting.

Other relevant information (like the type of technologies adopted and rejected and the comments of the smallholder farmers on the technologies and practices) through observation and informal discussions with smallholder farmers while working in the villages were jotted in the field notebook.

3.6.2 Data analysis

Data collected from the field were verified by the researcher in order to make sure that interview schedules had been filled in accurately and completely. Data for PFG and non-PFG members were summarized and condensed from interview schedules and transferred into the computer code sheet for processing. In order to draw inferences and conclusions, data were analysed using Statistical Package for Social Sciences (SPSS) at Sokoine University of Agriculture where descriptive statistics such as frequencies, percentages and means were determined. The cross-tab sub-programme was used to provide joint frequencies and distribution of variables. The t-test at 5% level of significance was used to test for statistically significant differences for some variables between PFG and non-PFG members. The Analysis of Variance [ANOVA] at 5% level of significance was also used to test for statistical significance among some variables for PFG and non- PFG members.

The few information collected from the extension staff and key informants were summarized for easier reference during discussion of analysed data for PFG and non-PFG members.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results from the analysis of data. The Chapter is divided into four sections.

a) Respondents' personal and farm characteristics and type of courses attended.

b) Respondents' adoption of selected improved rice technologies and practices.

c) Effect of adoption on respondents' increased rice yields due to NSPFP participatory approaches.

d) Respondents' attitudes with respect to working together to address rice production constraints.

The different sections in the chapter present the results, discusions and conclusions for the specific objectives studied. The major conclusions for the whole study are presented in Chapter Five.

4.2 Respondents' Personal and Farm Characteristics

4.2.1 Personal characteristics

The nature and extent of smallholder farmers participation in the selection, dissemination and utilization of improved rice technologies and practices was one of the unclear issues about NSPFP. Based on the literature, the researcher

anticipated four variables to be crucial to respondents' participation in various agricultural development programmes. The variables are age, gender, marital status and level of education.

4.2.1.1 Age

The results in Table 1 indicate that, the majority of the respondents, (84% of PFG and 88% of non-PFG members), are between the age of 26 and 50 years , while very few (7% of PFG and 3% of non-PFG members) are between 18 and 25 years. Nine percent of each are above 50 years. This implies that, the majority of respondents are middle aged people whom Ishengoma *et al* (1998), regarded as the most active, participative and productive segment of the rural population.

4.2.1.2 Gender

Out of 75 interviewed PFG members, 85% were female while for 75 non-PFG members 25% were females (Table 1). The data reveal that the PFGs in Mang'ula Division are constituted mostly by women. This shows that, women are more responsive in joining interest groups than men. This is because, apart from women being more involved in agricultural food production than men, they also looked at PFGs as a means of getting and sharing information on improved agricultural technologies.

Table 1: Distribution of Respondents According to Personal Characteristics

Personal characteristics	PFG members (n=75)		Non-PFG members (n=75)		
	Freq.	%	Freq.	%	Observed significance
Age groups					
18 - 25	5	7	2	3	
26 - 33	23	31	25	33	
34 - 41	27	36	15	20	
42 - 50	13	17	26	35	
Above 50	7	9	7	9	1.0 NS
Gender					
Male	11	15	56	75	
Female	64	85	19	25	1.0 NS
Marital status					
Married	65	87	57	76	
Single	4	5	11	15	
Divorced	2	3	4	5	
Widow	3	4	2	3	
Separated	1	1	1	1	1.0 NS
Level of education					
Adult education	6	8	8	11	
Primary education	49	65	56	75	
Secondary education	10	13	7	9	
Post secondary education	2	3	2	3	
No formal education	8	11	2	3	1.0 NS

4.2.1.3 Marital status

The majority of respondents were married, that is 87% of PFG and 76% of non-PFG members respectively (Table 1). The results further show that, very few were divorced (5% and 3%), widowed (4% and 3%) or separated (one percent of each category of respondents). It is also very interesting to note from the results in Table 1 that, the proportion of single respondents from PFG members is one third (5%) of those in non- PFG members (15%). In terms of marital status and gender the PFG members are relatively more homogeneous than the non-PFG members.

4.2.1.4 Level of education

The educational level of respondents is presented in Table 1. The majority of PFG and non-PFG members have obtained primary school education, that is 65% and 75% respectively. The data in the same Table indicate that 13% of PFG members and nine percent of non-PFG members had obtained secondary education, although the percentage of respondents who obtained post secondary education is the same (three percent) for both groups. This implies that, the literacy level of the respondents in Mang'ula Division is more than 80%. This is a potential for the extension staff and other rural development agencies trying to assist the farmers broaden their levels of knowledge in agriculture and other walks of life through written materials.

There was no significant difference in the personal characteristic of PFG and non - PFG members. The next sub-section will describe respondents' farm characteristics.

4.2.2 Farm characteristics

The term "farm" has many definitions and even interpretations depending on the context to which one is referring. In reference to the smallholder farmer's context, a farm is a developed piece of land which a farmer (one using the land) uses for various activities in order to sustain his or her life. One of the most important activities on the farm is agriculture, which is the major source of food, income and employment for about 85% of the Tanzanian's population (URT, 1992). Three important variables with regard to farm characteristics were investigated during the study. These were main food crops grown by the respondents, crop farm size and the main sources of farm labour.

4.2.2.1 Main food crops grown

Rice and maize are the major food crops grown by the majority of respondents (Table 2). The results show that 65% and 75% of PFG and non-PFG members respectively grow rice. Relatively few respondents, that is 29% of PFG and 20% of non-PFG members, grow maize. Five percent each, grow other crops like banana, pulses and root crops. The results indicate that rice is a major food and cash crop for the majority of the respondents.

Table 2: Distribution of Respondents According to Farm Characteristics

Farm characteristics	PFG members (n=75)		Non-PFG members (n=75)		Observed
	Freq.	%	Freq.	%	significance
Main food crop					
Rice	49	65	56	75	
Maize	22	29	15	20	
Others	4	5	4	5	1.0 NS
Crop farm size (Ha)					
Rice: 0.2 - 0.4	10	13	7	9	
0.44- 0.6	9	12	15	20	
0.64- 1.0	33	44	33	44	
1.04- 1.6	17	23	17	23	
Above 1.6	6	8	3	4	1.0 NS
Maize: 0.2 - 0.4	30	40	32	43	
0.44- 0.6	29	39	24	32	
0.64- 1.0	8	11	14	19	
1.04- 1.6	4	5	3	4	
Above 1.6	4	5	2	3	1.0 NS
Main sources of farm labour					
Own family	59	79	60	80	
Hired labour	6	8	13	17	
Group members	1	1	0	0	
Relatives	2	3	0	0	
Others	7	9	2	3	1.0 NS

Rice is the most suitable crop in Mang'ula Division although other complementary crops are also grown on a relatively small scale. Hoyle (1997) found that, Kilombero Valley is famous in Morogoro and Tanzania at large for its paddy production due to its abundant fertile alluvial soils and reliable rains. Hoyle further noted that, the local people in the area grow rice as a food crop, but in the absence of other cash crops, it also serves as the main cash crop.

4.2.2.2 Crop farm size

The results in Table 2 indicate that, the majority (67% each) of respondents grow rice on a farm size of between 0.64 and 1.6 hectares. The observations are in line with those of Hoyle (1997) that a typical smallholder farmer in Mang'ula Division cultivates rice on an average farm size of one hectare. Very few (8% and 4%) respondents grow rice on a farm size of above 1.6 hectares although the rest of the respondents who are relatively many (25% of PFG and 29% of non-PFG members), grow rice on a farm size of between 0.2 and 0.6 hectares.

The results in Table 2 also reveal that, 79% of PFG and 75% of non-PFG members grow maize on a farm size of between 0.2 and 0.6 hectares. Like for rice, very few respondents grow maize on farm size above 1.6 hectares, that is 5% of PFG and 3% of non-PFG members. In general, the total farm land under rice is more than that under maize and other crops although a typical subsistence mode of production is prominent (Appendix 5).

4.2.2.3 Main sources of farm labour

Developed land in many NSPFP villages in Morogoro Region is traditionally owned, with family members as the main source of farm labour in various field operations (Laizer, 1995). The observation is supported by the results in Table 2 where the majority, 79% of PFG and 80% of non-PFG members, use their own family labour for various farm activities. Hired labour as another source of farm labour, is also used by 8% and 17% of PFG and non-PFG members respectively. It is also interesting to note from the results in Table 2 that, a few PFG members use group members (1%)and relatives (3%)as sources of farm labour, a practice which is not seen with the non-PFG members. However, 9% of PFG and 3% of non-PFG members use other sources of farm labour like friends on rotational basis. This depends upon the farm size, farm proximity and the existing close relationship among the respondents. This was observed to be practiced by those respondents who are close together with more or less equal farm size situated around the same location. The reasons as posed by the respondents are realization of effective work, consolidation of friendship and advantage of sharing information and experiences with regard to rice farming.

4.2.3 Training of respondents

Farmers training is essential if the introduced and/or selected agricultural technologies and practices are to be utilized on a sustainable basis (Rutatora and Rutachokozibwa, 1995). Farmer training has been organized by various extension programmes operating in Mang'ula Division, according to the requirements and

interests of various groups of smallholder farmers.

The five courses conducted by NSPFP and other extension programmes are shown in Table 3. Many courses were conducted at Ifakara - Parish Hall and Msolwa Farmers Training Centre in Kilombero District. Very few courses were organized at KATC in Kilimanjaro Region. The choice of place was based on the available facilities with regard to rice farming and other factors like accommodation, meals and the costs of services. The results in Table 3 show that, more of PFG members (13%) attended courses on rice production technology as compared to 4% of non-PFG members who attended a similar course.

Relatively more (8%) PFG members attended courses on grain storage technology and animal production compared to only 2% of non-PFG members. The results in Table 3 further reveals that, PFG members received more training for each of the organized courses than non-PFG members except for rice irrigation technology which had equally low (1%) attendance. This implies that, PFG members are given more consideration by extension staff with regard to training than non-PFG members. Swai (1997) also found that, PFG members are provided with more information and skills to facilitate dissemination and adoption of agricultural technologies and practices.

However, the majority of respondents, 76% of PFG members and 92% of non-PFG members did not attend any of the courses organized by NSPFP. The ratio of the respondents who attended training to those who did not attend any training is too wide. For example, trained PFG members constituted 23% while trained non-PFG

members were only 7%. This is a substantial evidence that the rate of training smallholder farmers in most rural areas is very low. NSPFP have realized this fact and tried to speed up smallholder farmer's training on regular basis in order to fill the gap.

Table 3: Distribution of Respondents by Type of Course Attended

Type of course	PFG members (n=75)		Non-PFG members (n=75)	
	Freq.	%	Freq.	%
Rice production technology	10	13	3	4
Grain storage technology	3	4	1	1
Rice irrigation technology	1	1	1	1
Animal production	3	4	1	1
Bunds construction	1	1	0	0
No course at all	57	76	69	92

4.2.4 Conclusions

From the above results and discussions, four conclusions can be drawn:

1. There is no significant difference between PFG and non- PFG members in terms of personal, farm and training characteristics.

2. The majority of smallholder farmers in rural areas are mostly between the age of 26 and 50 years and own a farm size between 0.2 and 1.6 hectares.

3. Specific exploration of the opportunities and constraints of the target groups is important for initiating realistic and sustainable extension programmes. For example, high literacy level of the smallholder farmers and high rice production potential of Kilombero valley are some of the opportunities, whereas lack of a cash crop and the persistent wide gap that exists between trained and untrained farmers are the main constraints. These posit a challenge to many agricultural extension-oriented programmes that are working or intend to work in Kilombero District to try to tap the existing potential and narrow the persistent gap in farmer's training. The types of innovations and their adoption levels will be discussed in the next sub-section.

4.3 Selected Improved Rice Technologies and Practices

Participatory selection of rice and maize technical packages was one of the ways used by NSPFP to win smallholder farmers participation at different levels. The selection process started by organizing an orientation and training workshop for policy makers, local leaders, private sector, research and extension staff. The main objective was to create awareness and sensitize the key actors about NSPFP approaches and benefits. A closely related objective was to equip the frontline staff with participatory techniques (how to conduct farmers discussions, asking questions, making consultations and forming homogeneous interest groups) and to discuss on the available rice and maize technologies and practices. The extension and research staff together with PFG members selected the technical packages that meet

smallholder farmers needs and interests. The results on adoption levels of the selected rice technical package, reasons for adopting and rejecting rice technologies and practices will be discussed in the following sub-section.

4.3.1 Levels of adoption of selected improved rice technologies and practices

The results on respondent's adoption of improved rice technologies and practices are presented in Table 4. From the results, there is a variation in the adoption of rice technologies and practices among the PFG and non-PFG members. Figure 3 illustrates a farm of a PFG member who represents the majority of PFG members (72% and 97%) who adopted proper land preparation, High Yielding Variety(TXD 88), row rice planting, bunds construction and use of manilla strings. The constructed bunds impound rain water in the field, which facilitates the use of split fertilizer application and integrated weed control measure for good rice crop establishment by 96% of the PFG members. Figure 4 illustrates the likely problems that a farmer can face by not adopting bunds, broadcasting rice and planting local rice varieties (Supa Kilombero) which lead to poor rice crop establishment.

The established rice crop from local varieties will be drought prone, with poor tiller production due to lack of adequate moisture, and essential plant nutrients leached away by rain water on unbunded farm. A serious weed competition is also evident due to impossibility of adopting integrated weed management strategies which is not adopted at all by non-PFG members (Table 4).

Table 4: Distribution of Respondents by Adoption of Selected Improved Rice Technologies and Practices

Improved rice technologies and practices	PFG members (n=75)		Non-PFG members (n=75)	
	Freq.	%	Freq.	%
Proper seedbed preparation	73	97	71	95
High yielding variety TxD 88	72	96	45	60
Row Rice planting	73	97	54	72
Wooden row space markers	11	15	0	0
Bunds construction	54	72	51	68
Rotary weeders	7	9	0	0
Manilla strings	72	96	53	71
Herbicides	46	61	73	97
Split fertilizer application	72	96	59	79
Integrated pest management	72	96	0	0
Rice sickles	72	96	67	89
Foot paddy threshers	7	9	0	0
Proper grain storage	73	97	9	12
Average	54	72	37	49
Significant level DF = 24	t-value = 1.2		Observed Significance = 0.27 NS	

Fig. 3: Farm of a PFG Member who Planted TXD 88 Resulting into a Good Crop Establishment. Photograph Taken at Mang'ula A Village, March 1996

The results in Table 4 further reveal an extreme situation whereby the majority (96% and 97%) of PFG members have adopted integrated pest management and proper grain storage as compared with zero and 12% of non-PFG members who adopted the similar practices. An opposite picture is observed where 97% of non-PFG and 61% of PFG members have used herbicides. This indicates the synergy effect of NSPFP and Plant Nutrition Programme(PNP) which operated in the area with a credit component on fertilizer and herbicides. PNP however, worked more with non-PFG members who received herbicides on time. The PFG members worked more with NSPFP who received herbicides late from the stockist and hence discouraged the use of herbicides.

Fig. 4: Farm of a Non-PFG Member who Planted Supa Kilombero Resulting into a Poor Crop Establishment. Photograph Taken at Ichonde Village, March 1996.

The use of wooden row space markers, rotary weeders and foot paddy threshers are adopted by few (less than 16%) of PFG members, whereas none of the non-PFG members have adopted. Basing on the averages, the difference in adoption level of the rice technical package between PFG and non-PFG members was not statistically significant. This is an indication that, there was a rapid and even diffusion of the rice technical package in the study area. The participation of smallholder farmers in the development of the rice technical package and the modality used by extension staff in delivering the technologies in the package form have also promoted even dissemination and adoption.

Teri and Mattee (1987), are in line with the observation, when they noted that, the transfer of improved agricultural technologies from research centres to farmers has

fallen and the rate of adoption was far below expectations and requirements due to different reasons. One of the reason given was that, some technologies were provided in piece-meal and lacked follow-up at development and utilization stages. In addition, Benad (1989) observed that, the adoption or rejection of some part of the technical package varied greatly depending on the characteristics of the innovations. The sources, characteristics and reasons for adopting or rejecting the rice technologies are presented in the following sub-sections.

4.3.2 Sources of adopted improved rice technologies and practices

One of the current challenges facing the smallholder farmers in Tanzania is where to get the appropriate information that addresses their real needs. This has become an issue after realizing the insufficient local input and willingness of NGOs and local organizations to participate in providing information and undertaking activities at the farmers environment (Zijp, 1994). Table 5 shows that NSPFP, PNP, National Agricultural and Livestock Extension Rehabilitation Project(NALERP) and Sokoine Extension Project (SEP) has been the main sources of improved rice technologies and practices to respondents.

On the one hand, the results in Table 5 show that the PFG members have adopted ten improved rice technologies and practices, while on the other hand, the results in Table 6 reveal that the non-PFG members have adopted only eight from the selected rice technical package.

The majority (more than 64%) of PFG members adopted the technologies and practices when they were working with NSPFP.

Table 5: Distribution of PFG Members by Adopted* Improved Rice Technologies and Their Specific Sources (n=75)

Improved rice technologies and practices	NSPFP		PNP		NALERP		SEP		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Proper seedbed preparation	60	80	7	9	6	8	0	0	73	97
HYV.TXD 88	69	92	3	4	0	0	0	0	72	96
Row rice planting	70	93	3	4	0	0	0	0	73	97
Bunds construction	48	64	4	5	2	3	0	0	54	72
Manilla strings	72	96	0	0	0	0	0	0	72	96
Herbicides	10	13	13	17	13	17	0	0	46	61
Split fertilizer application	70	93	2	3	0	0	0	0	72	96
Integrated pest management	60	80	5	7	7	9	0	0	72	96
Rice sickles	65	87	7	9	0	0	0	0	72	96
Proper grain storage	50	67	13	17	8	11	2	3	73	97
Average	57	77	6	8	4	5	0.2	0.3	68	90
Significant level	Df = (3, 36)		F-observed = 76.24**				$F_{0.05}$ = 2.57			

*With reference to Table 4: Adopted means those technologies and practices with % level of $\geq$60.

Table 6: Distribution of Non-PFG Members by Adopted* Improved Rice Technologies and Their Specific Sources (n=75)

Improved rice technologies and practices	NSPFP		PNP		NALERP		Total	
	Freq	%	Freq.	%	Freq.	%	Freq.	%
Proper seedbed preparation	24	32	18	24	29	39	71	95
High yielding variety. TXD.88	25	33	14	19	6	8	45	60
Row rice planting	40	53	8	11	6	8	54	72
Bunds construction	45	60	4	5	2	3	51	68
Manilla strings	50	67	3	4	0	0	53	71
Herbicides	10	13	43	57	20	27	73	97
Split fertilizer application	15	20	30	40	14	19	59	79
Rice sickles	30	40	13	17	24	32	67	89
Average	30	40	17	22	13	17	59	79
Significant level	Df = (2,21)		F - observed = 3.87*			$F_{0.05}$ = 3.47		

*With reference to Table 4: Adopted means those technologies and practices with % level of ≥ 60.

At the same time, PFG members have been obtaining information from PNP, NALERP and SEP at varying degrees. Many PFG members (34%) who are slightly more than those working with NSPFP adopted the use of herbicides when they are working with PNP and NARLEP respectively. Very few (3%) PFG members obtained messages from SEP on proper grain storage despite the fact that the overall level of adoption of the technology is very high (97%).

Like the PFG members, many non-PFG members(more than 32%) learned the technologies and practices when they were working with NSPFP (Table 6). This has been the case for those technologies and practices that are disseminated by either PNP or NALERP or all of them. However, the results in Table 6 have come up with a specific message with regard to PNP. Apart from PNP focusing more on non-PFG members, more thrust was put on the use of herbicides and fertilizers. The majority of non-PFG members learned more on use of herbicides and fertilizers when they are working with PNP. It is also interesting to note from the results in Table 6 that SEP had little to share with non-PFG members.

Many non-PFG members learned more on proper seedbed preparation (39%), use of sickles (32%) and herbicides (27%) from NALERP. The general trend that is observed from Tables 5 and 6 is that, there is high adoption of those technologies and practices that respondents have learned from multiple sources. These findings are in line with those of Engel (1990), who found that farmers and extension agents access to multiple sources of information is key to effective transfer and adoption of agricultural innovations. However a significant difference was observed in terms of programme contact to respondents. NSPFP had the highest contact with the respondents than other programmes due to use of PFGs although an overlap of programme activities is noted in the study area. The aspect of programme reinforcing and complementing each other is also evident in the process of accelerating transfer and adoption of improved rice technologies and practices. Mannento (1990), noted a similar phenomenon with most extension programmes in Tanzania, but he called for coordination of the programmes and their activities in

order to reach clientele in a more cost effective way. The issue of coordination is also addressed by the Government of Tanzania in the National Agriculture and Livestock Extension Policy and Implementation Guidelines (MAC,1995). One of the objectives of the Ministry of Agriculture and Cooperative, is to improve coordination of extension activities conducted by the government and non-governmental organizations in order to avoid contradiction of messages and information overload to farm families.

4.3.3 Reasons for respondents adopting improved rice technologies and practices

In the preceding sub-sections, the levels of adoption and sources of improved rice technologies and practices for respondents were discussed. In this sub-section, the reasons of adopting improved rice technologies and practices will be discussed. From Table 7, the results indicate that, on average, more than 20% of PFG members adopted improved rice technologies and practices because they are triable, simple and consistent with past experience and needs of respondents. Very few PFG members (2%) as compared with 37% of non -PFG members (Table 8) mentioned that previous technologies and practices were not better than the selected ones as the reason for adoption.

Table 7: Distribution of PFG Members According to Adopted Improved Rice Technologies and Reasons for Adoption (n=75)

Improved rice technologies and practices	Reasons										Total	
	Previous technology is not better		Technology is consistent with past		Technology is simple		Technology is triable		Technology is observable			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Proper seedbed preparation	1	1	12	16	30	40	15	20	15	20	73	97
High yielding variety TXD 88	1	1	31	41	11	15	15	20	14	19	72	96
Row rice planting	1	1	12	16	10	13	30	40	20	27	73	97
Bunds construction	6	8	8	11	10	13	10	13	20	27	54	72
Manilla strings	1	1	31	41	10	13	15	20	15	20	72	96
Herbicides	2	3	7	9	5	7	14	19	18	24	46	61
Split fertilizer application	1	1	11	15	20	27	20	27	20	27	72	96
Integrated pest management	1	1	5	7	30	40	30	40	6	8	72	96
Rice sickles	2	3	25	33	25	33	10	13	10	13	72	96
Proper grain storage	3	4	12	16	25	33	25	33	8	11	73	97
Average	2	2	15	21	18	23	19	25	15	20	68	90
Significant level	Df = (4,44)				F-observed = 2.71*				$F_{0.05}$ = 2.58			

These results indicate the importance of training and involving farmers in selection of technologies and practices that suit their environments and aspirations. Unlike PFG members, the results reveal the degree to which non-PFG members are less informed of other attributes of selected rice technologies and practices. However,the observability of the selected technologies and practices is equally mentioned (20%) by both PFG and non-PFG members as the reason. This shows the extent to which the technologies are equally perceived and easily adopted by the majority of respondents. Rogers (1995:p.244), generalized the idea by saying that: "The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption". The results in Tables 7 and 8 have established two extremes for the respondents which emanates from the triability and the relative advantage of the selected rice technologies and practices. Relatively more PFG members (25%) adopted the selected rice technologies and practices because of being triable. The opposite is true for non-PFG members whereby 37% mentioned the previous technologies and practices as not being better than the selected ones as a reason. Probably it is due to varying degrees of trying out the technologies. The PFG members had an opportunity of trying the technologies during farmer's training at the demonstration farms. The picture that can be observed from the results in Tables 7 and 8 is that, the rice technologies and practices were adopted by the respondents because of two attributes, triability and relative advantage.

Table 8: Distribution of Non-PFG Members According to Adopted Improved Rice Technologies and Reasons for Adoption (n=75)

Improved rice technologies and practices	Reasons										Total	
	Previous technology is not better		Technology is consistence with past		Technology is simple		Technology is triable		Technology is observable			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Proper seedbed preparation	64	85	3	4	2	3	1	1	1	1	71	95
High yielding variety. TXD 88	2	3	10	13	4	5	3	4	26	35	45	60
Row rice planting	30	40	11	15	1	1	2	3	10	12	54	72
Bunds construction	24	32	10	13	2	3	3	4	12	16	51	68
Manilla strings	1	1	12	16	13	17	2	3	25	33	53	71
Herbicides	41	55	15	20	8	11	2	3	7	9	73	97
Split fertilizer application	6	8	10	13	1	1	2	3	40	53	59	79
Rice sickles	56	75	2	3	5	7	2	3	2	3	67	89
Average	28	37	9	12	5	7	2	3	15	20	59	75
Significant level	Df = (4,35)				F-observed 5.25*				$F_{0.05*}=2.65$			

4.3.4 Reasons for rejecting improved rice technologies and practices

Table 9 presents the results on the reasons respondents had for rejecting the rice technologies and practices. The PFG members have rejected three technologies while the non-PFG members have rejected the same technologies and two practices from the selected rice package.

There is a slight difference in the levels of rejection of rice technologies and practices. While the average rejection level of PFG members is 89%, that of non-PFG members is 98%, giving a difference of 9% which indicates the existing rejection-gap of rice technologies and practices between the PFG members and non-PFG members. However, the percentages across technologies and reasons given by respondents for rejecting the technologies and practices are more or less the same. For example, an average of 30% and 25% of PFG members have rejected the technologies because they are difficult and inconsistent with past experience respectively. For non-PFG members, the average was 28% and 25% .

The analysis also revealed that, there is no significant difference among reasons given for rejection between PFG and non-PFG members. However, there is a clear evidence from the results in Table 9 that simplicity of some rice technologies as an important attribute of a technology, is not well addressed by the programme. For example, Figures 5 and 6 illustrate the difficulties faced by the smallholder farmers in using the wooden row space markers. The space marker is too heavy for farmers to manoeuvre it, and is specifically suitable for well levelled fields with adequate moisture. In this case the space markers are easily dragged and mark points of intersection on the ground ready for planting the seeds or seedlings.

Table 9: Distribution of Respondents According to Type of Rejected Improved Rice Technologies and Reasons for Rejection

Improved rice technologies and practices/ respondents	Reasons										Total	
	Previous technology is better		Technology is inconsistence with past		Technology is difficult		Technology is not triable		Technology is not observable			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
PFG members (n=75)												
Wooden row markers	15	20	19	25	21	28	5	7	4	5	64	85
Rotary weeders	19	25	20	27	21	28	3	4	5	7	68	91
Foot paddy threshers	10	13	17	23	25	33	10	13	6	8	68	91
Average	15	19	19	25	22	30	6	8	5	7	67	89
Non-PFG members (n=75)												
Wooden row markers	15	20	18	24	22	29	11	15	9	12	75	100
Rotary weeders	19	25	22	29	18	24	10	13	6	8	75	100
Foot paddy threshers	10	13	20	27	19	25	14	19	12	16	75	100
Integrated pest management	20	27	24	32	22	29	4	5	5	7	75	100
Proper grain storage	19	25	10	13	23	31	10	13	4	5	66	88
Average	17	22	19	25	21	28	10	13	7	10	73	98
Significant level	Df = (1,6)		F-observed = 2.06NS						$F_{0.05}$ = 5.99			

4.3.5 Conclusions

The contribution of participatory selection of rice technical package, complementarity of different sources of technologies and the varying levels of respondents adopting and rejecting technologies have been observed from the above results. Basing on the discussions, two conclusions can be made:

1. The various characteristics of improved rice technologies such as relative advantage, triability and observability have contributed to different levels of adoption of the selected rice technical package.The extension programmes should consider these attributes among others if the developed and/or selected technical packages are to be successifuly adopted by the clientele.

2. Smallholder farmers' access to multiple sources of information is key to effective transfer and adoption of agricultural innovations although coordination is deemed necessary at all levels to realize the effect of adoption in crop production.

Fig. 5: A PFG Member Trying to Use a Wooden Row Space Marker to Establish the Rice Rows. Photo Taken at Mang'ula A' Village, March 1997.

Fig. 6: A PFG Member Trying to Use a Wooden Row Space Marker to Establish a Hill (point of intersection) for Planting Rice Seedlings. Photo Taken at Mang'ula A' Village, March 1997.

4.4 Effect of Adoption on Respondent's Rice Yields

4.4.1 Overview of rice ecosystem in Kilombero District

There are three rice production ecosystems in Morogoro Region: lowland rainfed, lowland irrigated and upland rainfed ecosystem (Kanyeka, 1995 Unpublished Paper). Lowland rainfed ecosystem is predominant in Kilombero District. On the basis of water management and some cultural practices, Kanyeka(1995) further sub-divided rainfed lowland rice ecosystem in Kilombero District into bunded shallow flooded and unbunded flooded rice growing environments. The dominant unbunded flooded rice ecosystem in Mang'ula Division and the smallholder farmers practices of growing low yielding local rice varieties (Supa Kilombero, Tule and Bwana, Shingo ya Mwali) with little use of herbicides and chemical fertilizers have curtailed increased rice yields (Laizer, 1995 Unpublished Paper). However, these smallholder rice farmers practices were central to the development of the recommended rice technical package. To some extent, the developed rice technical package has been adopted by smallholder farmers and the impact is felt by experiencing relatively higher rice yields.

4.4.2 Rating adoption of rice technologies and yields

The increase in adoption of rice technologies and yields have been mentioned by all the extension staff and key informants interviewed. Other researchers like Mngodo (1997) and extensionists like Mziray (1998 Unpublished Report) have also observed

an increase in adoption of rice technologies and yields. The results in Table 10 present evidence of this.

Table 10: Distribution of Respondents According to Rating of Levels of Adoption of Improved Rice Technologies and Rice Yield Improvement

Rating level	PFG members (n=75)		Non-PFG members (n=75)	
	Freq.	%	Freq.	%
Adoption				
Increased	67	89	69	92
Decreased	0	0	0	0
No change	8	11	6	8
Total	75	100	75	100
Rice Yields				
Increased	68	91	67	89
Decreased	0	0	0	0
No change	7	9	8	11
Total	75	100	75	100
Significance level	Df = 10	t = 0.0009	Observed significance = 0.9NS	

While 89% and 91% of PFG members felt that they were realizing an increase in adoption of rice technologies and yields respectively, 92% and 89% of non-PFG members had a similar feeling. The analysis indicates that there is no significant statistical difference in rating adoption of rice technologies and yields between PFG and non-PFG members. This is an indication of a steady flow of improved rice

technologies and practices to respondents to the extent that, there is the same feeling of a positive change in adoption and rice yields among them.

4.4.3 Attained average rice yields per hectare

The average rice yields in Tanzania is 1.74 tons/ha which is equivalent to 22 bags/ha (FAO, 1994). This is very close to regional rice yields which is 1.7 tons/ha equivalent to 21 bags/ha. Kilombero District average rice yields is 1.8 tons/ha (23 bags/ha) which is slightly higher than the national and regional average rice yields (Appendix 6). This is a yield level attained by 7% and 31% of PFG and non-PFG members respectively (Table 11). The results in Table 11 further show that, the majority of PFG members (85%) attained rice yield of between 2.7 and 6.4 tons/ha or between 34 and 80 bags per hectare.

Table 11: Distribution of Respondents According to Attained Rice Yield Ha

Rice yield range (*bags/ha)	PFG members (n=75)		Non-PFG members (n=75)	
	Freq.	%	Freq.	%
10 - 20	6	8	6	8
21 - 33	5	7	23	31
34 - 50	18	24	25	33
51 - 63	17	23	11	15
64 - 80	29	38	10	13
Total	75	100	75	100
Significance level	Df = 8	t-value = 0.009	Observed significance = 0.99NS	

* 1 bag of paddy = 80 kg

On the other hand, majority of non-PFG members (64%) have attained rice yield between 21 and 50 bags/ha or 1.7 to 4.0 tons/ha.

Very few respondents (8% each) are between 10 and 20 bags/ha, the yield which was being attained by smallholder farmers in Kilombero before the commencement of NSPFP in 1995. The rapid increase in rice yields for smallholder farmers was accelerated by the rapid increase in the flow and adoption of improved rice technologies and practices. This was coupled with VEOs and Group Demonstration Farmers' close assistance to smallholder rice farmers to overcome the rice production problems and adopt the rice technologies in a package form.

4.4.4 Frequency of visits paid by VEOs and GDFs

According to NSPFP, the VEO is a very close partner of GDF in the process of transferring the selected rice package to rice PFG members. In fact, the VEO is the patron or matron of the PFG and also a link between PFG and other partners interested in assisting smallholder farmers to solve the rice production constraints at grassroots level. Lack of visit by change agents to farmers and poor linkage with other relevant partners affects the transfer of technologies and technical information to smallholder farmers at the local level (Mbwana, 1995). Table 12 presents the results of frequency of visits paid by VEOs and GDFs. The results reveals that 88% of PFG members were visited by VEOs once to thrice a week, as compared to 84% of non-PFG members, who were visited by VEOs once a week to once a month.

Table 12: Distribution of Respondents According to Frequency of Visits Paid by VEOs and GDFs

Frequency of paying visit	PFG members (n=75)		Non-PFG members (n=75)	
	Freq.	%	Freq.	%
VEOs				
Once a week	6	8	30	40
Once a month	4	5	33	44
Thrice a week	60	80	4	5
We visit VEO on need basis	3	4	3	4
No visit at all	2	3	5	7
Total	75	100	75	100
GDFs				
Once a week	9	12	0	0
Once a month	1	1	0	0
Thrice a week	14	19	0	0
We visit GDF on need basis	44	59	65	87
No visit at all	7	9	10	13
Total	75	100	75	100
Significance level	Df = 18	t-value = 0.0009	Observed significance = 0.99NS	

While the majority, 59% of PFG and 87% of non-PFG members are visiting the GDF on need basis, very few (4% each) visited the VEO on need basis. It is important to note from these results that, it has been easier for smallholder farmers to pay visits to GDFs than to VEOs. Hulls (1975) noted that informal farmer to

farmer contacts are easier and more effective in the dissemination of technical information than informal contacts with extension agents who have many farmers to contact. Mbwana (1995) further commented that, demonstration farmers form a better source of technical information than VEOs who are rarely available to give advise. The dissemination of information at local level in most parts of Tanzania is low because there are very few trained demonstration farmers and limited participation of the farmers in the whole technology development, transfer and utilization paradigm (Rutachokozibwa, 1995). Rutachokozibwa therefore called for closer involvement of farmers in order to cut down time between development and utilization of agricultural innovations.

4.4.5 Extension approaches and frequency of use by extension staff to facilitate transfer and adoption of rice technologies and practices

Agricultural extension services help to educate and assist farmers to solve their farming problems and thereby adopt improved farming practices and increase agricultural production (Ibrahim, 1992). Since agricultural extension utilizes education as a means, it must obviously embrace participation of learners (farmers) and facilitators (extension staff). A participatory approach to extension therefore emerges, which depicts an orientation towards enhancing involvement or interaction with clientele in the extension process. The experience with NSPFP in Morogoro Region shows that PFG meetings, farm demonstrations, workshops and seminars, farmers field days and trained demonstration farmers are the participatory extension

approaches used to promote clientele participation in development, transfer and utilization of rice technologies and practices at local level.

Table 13 shows the extension approaches used by extension staff to facilitate transfer and adoption of the selected rice technical package. The majority of PFG members (99%, 96% and 40%) noted that the extension staff use more frequently PFG meetings, farm demonstrations and trained demonstration farmers respectively at least thrice a month to facilitate transfer and adoption of rice technologies. The majority of non-PFG members (59%, 35% and 13%) on the other hand, mentioned farm and home visits and farm demonstrations respectively as the extension approaches which were used at least thrice a month by extension staff. However, farm demonstration is repeatedly mentioned as the extension approach used most frequently by the extension staff to facilitate transfer and adoption of rice technologies and practices.

Under NSPFP, farm demonstration is used as a starting point for organizing consultations between smallholder farmers and other key actors. It is also used to provide a means of showing the effects of chosen technical innovations and evaluating the responses over a large number of farmers from different socio-economic groups in the community. Biggs (1989) called these consultative and collaborative participation respectively.

Table 13: Distribution of Respondents According to Approaches Used and Frequency of Use by Extension Staff to Facilitate Adoption of Improved Rice Technologies and Practices

Approaches/ Respondents	At least thrice a month		At least once a month		At most twice per season		Not at all	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
PFG members (n=75)								
PFG meetings	74	99	1	1	0	0	0	0
Farm demonstrations	2	96	0	0	3	4	0	0
Workshop and Seminars	4	5	11	5	57	76	3	4
Field days	2	3	3	4	64	85	6	8
Trained demo farmers	30	40	39	52	4	5	2	3
Farm visits	12	16	51	68	12	16	0	0
Home visits	3	4	30	30	37	49	5	7
Leaflets	0	0	1	1	36	48	38	51
Average	25	33	17	21	27	35	7	9
Non-PFG members (n=75)								
PFG meetings	3	4	13	17	23	31	36	48
Farm demonstrations	10	13	35	47	26	35	4	5
Workshop and seminars	0	0	1	1	19	26	55	73
Field days	1	1	1	1	67	89	6	8
Trained demo farmers	7	9	20	27	25	33	22	29
Farm visits	44	59	19	25	11	15	1	1
Home visits	26	35	37	49	10	13	2	3
Leaflets	1	1	3	4	4	5	67	89
Average	12	15	16	21	23	31	24	32
Significance level	Df=14		t-value =1.12		Observed significance = 0.35NS			

Ashby (1990) argues that collaborative mode of participation is used to get farmer's reactions to prototype technologies early, whereas consultative mode is used to involve farmers later in the technology development process.

The results in Table 13 reveal that, trained demonstration farmer as related to the demonstration farm is another approach mentioned by the majority of respondents (52% and 27%) to be used by extension staff at least once a month. Qrtiz *et al.*, (1989) with Guatemala's experience, realized the trained demonstration farmers has a tremendous potential to disseminate agricultural innovations faster and on wider scale provided they are made partners in the technology change process. The results further reveal that, although NSPFP have recommended the use of selected participatory approaches, the extension staff are also using conventional extension methods (like farm and home visits) in addition to influence farmers participation. The analysis indicates that, there is no significant statistical difference in the frequency of used extension approaches between PFG and non-PFG members. Although Farmers Field Days are less used by extension staff as mentioned by majority of respondents (85% and 89%), they are found to be the most effective extension approaches. Farmers Field Days promote more exchange of views, experiences, clearance of doubts and differences on the part of farmers.The research and extension staff also receive direct feedback about the farmers' feelings on the developed technical packages. Infact, Farmers Field Days bring extension and research staff, private sector, policy makers, donor agencies and community

members into direct contact with farmers (Figure 7). At these occasions, the demonstration farmers, have the opportunity to explain to the audience, what they did for the entire season (Figure 8). Despite the recognition of the importance of printed materials and high literacy levels of smallholder farmers in Mang'ula Division, the majority of respondents (51% and 89%) observed that, extension staff have not used leaflets to facilitate dissemination and adoption of rice technologies. This is due to financial constraints facing the extension services as mentioned by all six interviewed extension staff. Lack of funds led to production of inadequate copies distributed to farmers. In addition, Mbwana (1995) noted that, some of the leaflets are beyond the reach of smallholder farmers and the contents of some are even irrelevant. Printed materials are useful media that can be used in conjunction with other extension media to disseminate information to farmers, which will enable them to adopt improved agricultural technologies. While financial constraints and content of printed materials are some of the factors that prevented the use of leaflets to disseminate information to farmers, some other factors have prevented the respondents themselves from adopting improved rice technologies and practices.

Fig. 7: All Key Actors Meeting Together at the Demonstration Farm to See the Potential of Using Improved Rice Technologies and Practices at Ichonde in 1996.

Fig. 8: The Demonstration Farmer of Tujiendeleze Rice Farmers Group at Mang'ula A' Explaining While Answering Questions During FFD of 1996.

4.4.6 Perceptions of respondents on factors that prevented adoption of improved rice technologies and practices

The results in Tables 14 and 15 show the institutional, ecological and socio-economic factors which prevented some of the repondents from adopting some of the improved rice technologies. Ecological and socio-economic factors have been mentioned by the majority of respondents (more than 87% of PFG and 67% of non-PFG members) as having prevented the adoption of improved rice technologies and practices. Unfavourable weather conditions, lack of reliable markets for paddy, inadequate money and tractors are some of the specific factors pointed out by over 89% of PFG and over 80% of non-PFG members. Hoyle (1997) noted that, different families around UMNP can only cultivate 0.8 hectares of paddy, due to lack of markets to sell paddy when farmers are desperate for cash to pay for the scarce tractor power and for other field operations.

Other institutional factors like unavailability of technologies, unreliable stockists and inadequate credit facilities are also mentioned by over 57% of PFG and 31% of non-PFG members to have prevented adoption of rice technologies. It is interesting to note from the results in Tables 14 and 15 that, the majority of respondents have a common view on the institutional and socio-economic factors that are said to have prevented adoption. For example, more than 84% of PFG and 45% of non-PFG members disagreed with factors like: the selected rice technologies do not improve rice production; VEO advise is inadequate; and GDF is

Table 14: Distribution of PFG Members According to Factors that Prevented Adoption of Improved Rice Technologies (n= 75)

Factors	Agree		Disagree		Don't know	
	Freq.	%	Freq.	%	Freq.	%
Institutional						
. Technologies not available	62	82	5	7	8	11
. Technologies don't improve production	5	7	63	84	7	9
. Unreliable stockist	67	89	6	8	2	3
. Inadequate credit facility	43	57	30	40	2	3
. Inadequate VEO advise	5	7	70	93	0	0
Ecological						
. Unfavourable weather conditions	71	95	4	5	0	0
Socio-economic						
. Many household obligations	69	92	5	7	1	1
. Inadequate money to buy inputs	69	92	5	7	1	1
. Technologies too expensive	65	87	7	9	3	4
. Lack of reliable markets	67	89	6	8	2	3
. Low prices for paddy	75	100	0	0	0	0
. Lack of transport facility	65	87	10	13	0	0
. Inadequate tractors	69	92	5	7	1	1
. Uncooperative GDF	6	8	69	92	0	0
Average	52	70	20	27	2	2
Significance level	Df=26		t-value=3.19		Observed significance=0.004*	

Table 15: Distribution of Non-PFG Members According to Factors that Prevented Adoption of Improved Rice Technologies (n=75)

Factors	Agree		Disagree		Don't know	
	Freq.	%	Freq.	%	Freq.	%
Institutional						
. Technologies not available	23	31	41	55	11	15
. Technologies don't improve production	5	7	57	76	13	17
. Unreliable stockist	29	39	3	4	43	57
. Inadequate credit facility	30	40	4	5	41	55
. Inadequate VEO advise	23	31	49	65	3	4
Ecological						
. Unfavourable weather conditions	66	88	3	4	6	8
Socio-economic						
. Many household obligations	50	67	13	17	12	16
. Inadequate money to buy inputs	71	95	3	4	1	1
. Technologies too expensive	29	39	22	29	24	32
. Lack of reliable markets	63	84	11	15	1	1
. Low prices for paddy	26	35	35	47	14	19
. Lack of transport facility	26	35	44	59	5	7
. Inadequate tractors	71	95	4	5	0	0
. Uncooperative GDF	13	17	34	45	28	37
Average	38	50	23	31	14	19
Significance level	Df = 26		t-value = 1.47		Observed significance = 0.15NS	

uncooperative, respectively. Very few PFG members (7% and 8%), as compared with 31% and 17% of non-PFG members, contradicted the feeling that the VEO's advise is inadequate or the GDF is uncooperative. This indicates that, PFG members have more interaction with VEOs and GDFs than non-PFG members. This was also observed by Swai (1998) when she noted that, there is effective communication of improved rice and maize technologies to PFG members because they have more contacts with extension officers than non-PFG members.

The analysis indicates that, while the effect of the factors on adoption of improved rice technologies as felt by PFG members is statistically significant (0.004), that for non-PFG members is not significant (0.15). This implies that, the PFG members are more informed and conscious of their situation and conditions than the non-PFG members. Helping smallholder farmers organize themselves into groups, is an opportunity for them to explore together about the constraints and potentialities that exist in their environment. The togetherness of smallholder farmers will pave the way for the establishment of feasible strategies to overcome the production constraints and tap their potentialities in order to improve their standards of living.

4.4.7 How groups facilitate or inhibit adoption of improved rice technologies and practices

The central element in people's participation programmes is the formation of viable and stable farmers' groups as the first step in a long-term institutional building process (FAO, 1990). Lugeye *et al* (1996), commented that, working with farmers' groups in Tanzania is now becoming a deliberate strategy in order to reach a large number of clientele given the available limited resources. In addition, groups help to empower the smallholder farmers who are underdogs by providing them with an instrument for participation in local decision making, regarding the wise use of available resources in their environment (Ndulu, 1990).

Table 16 presents further information on how groups have facilitated and/or inhibited the PFG members in the adoption of the selected rice technical package. The results show that, the majority of PFG members (69%) are facilitated by the groups to get inputs on credit, regular training and easy contact with extension services respectively. PFGs being central foci for NSPFP in enhancing participatory development, transfer and adoption of rice technologies, are also linked with the selected stockists who supply inputs according to established group input effective demand. It is now evident that PFGs under NSPFP are forming a base for participatory problem solving as mentioned by 9% of PFG members. Apart from PFGs being used as learning fora which facilitate farmer's training they are also used as demonstration units of rice production which give a realistic picture of the smallholder farmers who have adopted the appropriate rice technical package.

The results in Table 16 further reveal that 14% of PFG members noted groups to facilitate easy organization among them and easy rice price control.

While 5% appreciate that being in groups have facilitated more sharing of experiences and information, 9% and 8% complained of late input delivery and persistent lack of rice marketing channels to have inhibited them to adopt the rice technologies. This was common to those PFG members who were living at the periphery of the villages where accessibility to information and inputs is difficult. This was aggravated by the existing market liberalization policies whereby cheaper rice was imported into the country by big businessmen to flood the local markets.

This resulted to most smallholder rice farmers not using inputs at all in some seasons and not selling the already harvested rice hence low rice yields.

Table 16: Distribution of PFG Members by How Groups Facilitated or Inhibited Adoption of Improved Rice Technologies and Practices (n=75)

Group facilitation/inhibition	Freq.	%
Facilitation		
. Getting inputs on credit	30	40
. Getting regular training	12	16
. Easily organized	5	7
. Easy control of rice prices	5	7
. Easy contact with extension services	10	13
. More sharing of experiences and information	4	5
. More participatory problem solving	7	9
Inhibition		
. Experienced persistent low rice yields	4	5
. Persistent lack of grain markets	6	8
. Late delivery of inputs	7	9

The situation is also mentioned by four out of six interviewed extension staff and all key informants. The bureaucracy that exists within the National Agricultural Inputs Trust Fund (NAITF) which facilitate the selected stockists have contributed to late procurement and distribution of inputs to PFG members. Late advancement of loans to stockists by NAITF, led to delayed procurement and distribution of inputs to PFG members. Poor physical infrastructure, lack of viable and potential buyers and unfavourable price policies as mentioned by all key informants are some of the reasons for lack of reliable market channels for smallholder rice farmers in Kilombero District.

4.4.8 Perceptions of non-PFG members towards PFG members

The results in Table 17 present the perceptions of non-PFG members about PFG members. The majority (66%) noted that the PFG members are realising more rice yields per hactare and are provided with inputs on credit. More regular training on improved rice technologies and improved household income are other differences mentioned by 28% of non-PFG members.

While 11% of non-PFG members mentioned easier contact with extension services to PFG members, 4% and 3% mentioned improved living standards and ownership of bank savings accounts as other differences.

Tables 17: Distribution of Non-PFG Members According to Their Perceptions of PFG Members (n=75)

Differences	Frequency	%
. Experiencing improved rice yields	25	33
. Experiencing improved living standards	3	4
. Have easier contact with extension	8	11
. Have more regular training	12	16
. Have improved household income	9	12
. Have more ownership of bank savings account at NMB or CRDB (1996) Ltd	2	3
. They have more recognition from the government and NGOs	4	5
. Have more access to input on credit	25	33

The observation by non-PFG members are in line with the primary and secondary objectives of NSPFP. The primary objective is to improve dissemination of

improved rice technologies by strengthening and establishing linkages with other supporting institutions in order to improve agricultural productivity and hence standards of living of smallholder farmers. Establishing and owning savings accounts at NMB Ltd or CRDB(1996) Ltd is to prepare the PFGs to become future active farmers associations which can deposit and borrow from the financial institutions in order to sustain agricultural productivity and thus improve the household incomes of their members.

Active farmers' associations are the missing link in many African and Carribean Pacific countries' agricultural development strategies (Waweru, 1997). Many successful countries in Africa with agriculture as the mainstay of the national economy, are mostly facilitated by the driving force coming from group activities. Smallholder farmers therefore, should be encouraged to form themselves into groups which can represent their interests and stimulate the national economic growth.

4.4.9 Motivation of non-PFG members for joining or for not joining groups

While provision of inputs on credit and regular training is taken by majority of PFG members as a means to facilitate dissemination and adoption (Table 16), the majority of non-PFG members (32% and 29%) take them as motivators for joining rice PFGs (Table 18). Togetherness of PFG members in problem solving is mentioned by 21% of non-PFG members to be a motivation for joining rice PFGs, although none of the PFG members mentioned it to facilitate dissemination and adoption of the selected rice technical package.

It is interesting to note from the results in Tables 18, 15 and 14 that, when the majority of both PFG and non-PFG members take many household obligations to be one of factors that inhibited dissemination and adoption, few non-PFG members (4%) take it as a reason for not joining groups. This is a substantial evidence to extension staff, of how smallholder farmers' many household

Table 18. Distribution of Non-PFG Members According to Motivation for Joining or for not Joining Groups (n=75)

Motivation	Freq.	%
For joining:		
. Availability of inputs on credit	24	32
. Improved rice yields per acre	8	11
. Togetherness of PFG members in problem solving	16	21
. Easy access to extension services	5	7
. Regular training to PFG members	22	29
Total	75	100
For not joining		
. No apparent reason	62	83
. Many PFGs are composed of women (gender bias)	5	7
. Limitation of age (too old)	4	5
. Many household obligations	3	4
. Conflict among group members	1	1
Total	75	100

obligations affect their level of performance at the farm level. On one hand, they limit farmers' participation in dissemination and utilization of the selected rice technical package which will increase farm productivity. On the other they act as inhibitors for farmers to join groups. It is therefore important for extension staff and other rural facilitators to take note of smallholder farmer's many household obligations as crucial determinants to participation in various agricultural extension programmes which entail group activities. However, the majority of non-PFG members (83%) have no apparent reasons for not joining groups although few (7% and 5%) mentioned reasons related to gender and old age respectively. The proportion of old farmers in most PFGs is relatively small because the old farmers see the selected rice technical package as too intensive for them to follow. Some technologies and practices, like use of wooden row space markers,bunds construction and row rice planting demand a lot of their time and energy. Parallel to this, regular farmers training and PFGs meetings to review and discuss on critical issues emanating from the adoption of the rice package is also seen by old farmers as taking too much of their time.

4.4.10 Conclusions

In view of the above discussions on the effect of adoption on increased rice yields due to NSPFP participatory approaches, three conclusions can be made.

1. There is a slight increase in rice yields for both PFG and non-PFG members due to the steady flow and adoption of improved rice technlogies and practices. The slightly felt positive change is contributed by the NSPFP

participatory approaches used by extension staff to accelerate transfer and adoption of improved rice technologies. Extension services should therefore put more emphasis on the use of participatory approaches in order to promote dissemination and utilization of agricultural innovations.

2. Provision of agricultural inputs on credit and regular farmers training are both facilitating and motivating to farmer's participation in the dissemination and adoption of improved rice technologies and practices. Agricultural extension programmes should therefore consider these factors by focussing more o n farmers training and forging linkages with the input suppliers in order to enhance clientele participation at different stages of the extension programme.

3. PFG Meetings, Farm Demonstrations and Farmers Field Days as some of the selected NSPFP participatory approaches, provision of inputs on credit and farmer training are key factors in increased adoption of improved rice technologies at Mang'ula Division. The approaches, have established a point of departure from contract to collaborative and consultative modes of participation, a missing ingradient in most extension systems. The approaches promote the spirit of working together amongst key actors in agricultural development by forging shared objectives and commitment to a common goal.

4.5 Attitudes of Key Actors with Respect to Interaction to Address Rice Production Constraints

4.5.1 Introduction

Agricultural development as a continuous process needs actors to start and maintain the process. The smallholder farmers being the main actors, have to organize themselves, so that they can work together with other key actors like research and extension staff, local leaders, business institutions, donor agencies and policy makers as equal partners (Mattee and Lassalle, 1995). The smallholder farmers in most rural areas are constantly being challenged with new problems and constraints, that have to be solved through participatory innovation development. The innovations constitute areas where farmers and other actors have to play different complementary roles which have to be apparent in the whole process of innovation development, transfer and utilization.

The misleading metaphor, that an innovation is a single uniform product that is generated by researchers and flows downstream to farmers in a one-way linear process, is proved wrong by the reality (Roling, 1989; Zijp, 1994 and Eponou, 1996). Smallholder farmers are neither depositories of technologies that are developed somewhere else nor passive consumers. Smallholder farmers are active problem solvers who in fact develop and transfer for themselves most of the technologies they use. This hard fact, is slowly sinking into the minds of research and extension staff who are now acknowledging the feedback of farmer's reactions on new technologies as desirable in order to refine the technology.

Direct links with farmers contribute to the relevance of the technology development by providing rapid feedback to research and strong links with extension for effective dissemination of verified technologies. Some researchers like Chambers, Pacey and Thrupp (1989), argued that, the process of generating and transferring technologies should not be left to research and extension staff themselves. Rather, all participating parties in the system of technology development and transfer should be involved from the early stages of programme planning and evaluation. Havelock (1979) advocates an interaction or linkage between potential users and potential resources by the formula "WHO" says "WHAT" to "WHOM" by "WHAT CHANNEL" to "WHAT EFFECT" and for "WHAT PURPOSE". The context in which an agricultural technology system operates, strongly influences the performance of established linkages. The key forces in the outside environment are national agricultural policies, donor behaviour and the diverse farming systems targeted by research and extension.

The researcher was interested to find out the extent to which the respondents recognize the key actors they interact with, the initiators, the frequency, place and even purpose of interaction. These form the sub-sections which will be the centres of discussions in this last section of results and discussions.

4.5.2 Knowledge of respondents about the key actors

Table 19 presents the results on the extent of respondents' recognition of the key actors during the cropping seasons. The majority of PFG members (over 65%) have the knowledge of all key actors. Compared to PFG members, fewer non-PFG

members (47% and less)have the knowledge of the DALDO, DEO, RS and IS.

It is interesting to note from the results that, the degree of knowledge for both PFG and non-PFG members of extension staff is the same and the highest (99%) across the key actors. This indicates the extent to which smallholder farmers are more closer to the extension staff than to other key actors. The analysis reveals that statistically the knowledge between PFG and non - PFG members on key actors in non - signifiant (0.086).

Table 19. Distribution of Respondents According to Knowledge of Key Actors

Key actors	PFG members (n=75)		Non-PFG member (n=75)	
	Freq.	%	Freq.	%
Member of Parliament (MP)	69	92	73	97
District Commissioner (DC)	68	91	72	96
District Agriculture and Livestock (DALDO)	63	84	33	44
District Extension Officer (DEO)	59	79	35	47
Divisional Secretary (DS)	69	92	72	96
District Action Officer NSPFP (DAO)	69	92	48	64
Ward Councillor (DW)	69	92	73	97
Extension Staff (ES)	74	99	74	99
Research Staff (RS)	69	92	3	4
Input Supplier (IS)	49	65	12	16
Significance level	Df=18	t-value =1.86	Observed significance = 0.086NS	

4.5.3 Initiators of contact during the cropping seasons

The results on Table 20 show that, NSPFP staff are the main initiators of contacts amongst key actors for both PFG and non-PFG members. The PFG chairperson and secretary have equally (7%) contributed to initiating the contacts among key actors. The Divisional Secretary and the village chairperson are also seen to have assisted in the initiation of contacts among the key actors as indicated by 19% of non-PFG members. This is a substantial evidence of the deficiency that exists on the part of most extension staff in initiating contacts of the pre-determined number of smallholder farmers with the key actors at one given time in the process of improving agricultural production.

In National Agriculture and Livestock Extension Policy and Implementation Guidelines(URT 1995), the government stated that each VEO will work with 800 - 1,000 farm families where the cropping pattern is less intensive. In case the intensity of the cropping pattern is high, the VEO will work with 500-600 farm families. The results in Table 20 reveal that, while the NSPFP staff contacts to PFG members is 76%, that for non-PFG members is less than 50%. One of the main reasons as mentioned by all six extension staff interviewed is the lack of logistic support to enable them to contact the scattered non-PFG members in their respective locations. The issue appears not to be well addressed by the Ministry of Agriculture and Cooperatives as stipulated in the Agricultural Extension Policy. To a large extent, this has frustrated the efforts of most extension staff to conduct regular visits and relaying information to a reasonable number of clientele.

Table 20. Distribution of Respondents According to Initiators of Contact Amongst Key Actors

Organizers	PFG members (n=75)		Non-PFG members (n=75)	
	Freq.	%	Freq.	%
NSPFP Staff	57	76	36	48
PFG Chairperson	5	7	5	7
PFG Secretary	5	7	5	7
Divisional Secretary	0	0	12	16
Village Chairperson	0	0	2	3
Someone else	8	10	15	20
Significance level	Df=10	t-value =-0.08	Observed significance = 0.938NS	

In fact, the areas given to VEOs to cover is not manageable, taking into consideration the means of transport the extension staff are having (mainly broken bicycles and motorbikes), lack of money to buy fuel and spare parts and the extension staff residence which is located at the periphery of the village. To alleviate the situation, some smallholder farmers used to get agricultural information from neighbours who may or may not necessarily be PFG members. This have been revealed by 10% and 20% of PFG and non-PFG members respectively, although it is more pronounced for non-PFG members who have relatively lesser contacts with NSPFP staff.

4.5.4 Places of contacts amongst key actors during the cropping seasons

Smallholder farmer's participation in agricultural development have to be influenced and sustained along with other important actors for participatory extension programmes to have effect in alleviating rural poverty. The Berlin Expert Consultation of 1985 concluded that "a basic solution to alleviation of rural poverty is to respect and influence autonomous independent farmers organizations and those who work with them" (Oakley, 1987 p 14). This implies that, the creation of a conducive atmosphere and better premises for interaction, persuasion and mutual understanding is necessary. While Zanen and DeGroot (1991) noted participation of people will be enhanced by treating them as knowledgeable and trustworthy, Kisusu (1998) reported that, sustainable participation and contacts among different partners can be influenced by conducive opportunities genuine to participation.

The challenge facing most extension programmes, is to find out appropriate opportunities that combine the high level of participation and infuse the attitude of contact among key actors. NSPFP tried four opportunities or premises in order to achieve the above goal, namely Demonstration Farms, PFG meetings, Workshops or seminars and Farmers Field Days. The results in Table 21 indicate that, on average, 85% of PFG members contacted the key actors at the Farmer's Field Days. Like the PFG members, the majority of non-PFG members (95%) contacted the key actors at the Farmers Field Days. Farmers Field Days are commonly mentioned by the majority of respondents to be the premises they interacted with other key actors during the cropping seasons.

It is at these premises, where all the actors not only verify the results of using improved agricultural technologies, but also become aware of their working relationships among them which creates some incentive for developing stronger ties. The challenge facing research and extension institutions therefore is to develop a greater capacity to forge stronger ties between them and among other key actors.This requires the shift in research and extension policies and priorities and also changes in the organization and management of research and extension services. Unlike the non-PFG members, the PFG meetings have been the extra premises for PFG members to contact the input supplier (37%), extension staff (26%) and policy makers (20%). Indeed, these are the right actors who are responsible for providing information to smallholder farmers regarding input availability, distribution, utilization and repayment of the collected inputs on credit. It is also unique from the results that, extension staff are more constantly seen across the premises for PFG members than non-PFG members who used to see the extension staff at the Farmers Field Days and Demonstration Farms. This is evidence that PFGs are becoming attractive structures to extension staff as they reduce the workload, improve coverage and facilitate contacts amongst key actors at various places. PFG meetings therefore are important places for extension services as they serve as vehicles of useful agricultural information to the whole farming community.

Table 21. Distribution of Respondents by Known Key Actors and Places of Contact During the Cropping Seasons

Key actors/ Respondents	Demonstration farm		PFG meeting		Workshop or seminar		Farmers field day	
	Freq	%	Freq	%	Freq	%	Freq	%
PFG members (n=75)								
MP	7	9	3	4	0	0	65	87
DC	1	1	6	8	1	1	68	90
DALDO	6	8	5	7	4	5	60	80
DEO	6	8	0	0	14	19	55	73
DS	11	15	15	20	0	0	49	65
DAO	10	13	10	13	2	3	53	71
DW	3	4	6	8	7	9	59	79
ES	8	10	10	13	11	15	43	57
RS	12	16	1	1	3	4	59	79
IS	20	27	22	29	1	1	32	43
Average	8.4	11	8.	10	4	6	54	84
Non-PFG members (n=75)								
MP	3	4	0	0	0	0	72	96
DC	5	7	0	0	0	0	70	93
DALDO	11	15	10	13	9	12	45	60
DEO	13	17	3	4	0	0	59	79
DS	3	4	1	1	1	1	70	89
DAO	5	7	3	4	0	0	67	89
DW	2	3	0	0	3	4	70	93
ES	14	19	1	1	1	1	59	79
RS	4	5	3	4	0	0	68	90
IS	0	0	0	0	0	0	75	100
Average	6	8	2	3	1.4	2	66	95
Significance level	Df=18		t-value =0.52			Signif. =0.609NS		

4.5.5 Frequency of contact amongst key actors

The capacity of smallholder farmers and other actors to innovate is often limited by lack of relevant information. The establishment of linkages among stakeholders and use of participatory approaches are among the strategies to promote steady and two-way flow of information to the people in need. Eponou (1996), noted that almost

all the linkage mechanisms in place conveyed information from research to extension and to farmers. An effective flow of information in the other direction and beyond is lacking.

The feedback from extension staff and farmers - the key to the relevance of future technologies is weak. The premises which would allow an effective retrieval and sharing of information between and among actors are not fully exploited to meet the information needs of the resource-poor farmers. Traditionally, resource-poor farmers lack the power and organizational ability to exert pressure on various institutions to meet their needs. Their access to information is restricted, their capacity to tolerate risks is also limited, their ability to articulate their needs is poor and the pressing concern of their daily existence makes it difficult for them to focus on long-term technological change (Eponou, 1993). Regular meetings among the key actors are likely strategies to initiate a dynamic participatory process for constraints analysis and encouraging the smallholder farmers to articulate their own perceptions of constraints impeding agricultural productivity.

Table 22 presents the results on respondents' frequency of contacts among the key actors to address rice production constraints. From the results, the majority of PFG members met with Extension staff (95%) and District Action Officer (80%) at least thrice a month, contrary to 30% of non-PFG members. While the majority (55%) of PFG members had contacts with DALDO and DEO at least once a month, very few (9%) non-PFG members contacted them at the same frequency.

Table 22. Distribution of Respondents by Frequency of Contacting the Key Actors

Key actors/ Respondents	At least thrice a month		At least once a month		At most twice per season		Not at all	
	Freq	%	Freq	%	Freq	%	Freq	%
PFG members (n=75)								
MP	1	1	1	1	70	93	3	4
DC	0	0	3	4	59	79	13	17
DALDO	1	1	9	12	45	60	20	27
DEO	0	0	32	43	22	29	21	28
DS	3	4	19	25	39	52	14	19
DAO	60	80	1	1	7	9	7	19
DW	16	21	17	23	29	39	13	17
ES	71	95	4	5	0	0	0	0
RS	0	9	9	12	49	65	17	23
IS	4	5	8	11	63	34	0	0
Non-PFG members (n=75)								
MP	1	1	2	3	69	92	3	4
DC	1	1	9	12	60	80	5	7
DALDO	0	0	4	5	28	37	43	57
DEO	0	0	3	4	31	41	41	55
DS	3	4	34	45	32	43	6	8
DAO	1	1	21	28	29	39	24	32
DW	8	11	38	51	24	32	5	7
ES	22	29	49	65	3	4	1	1
RS	0	0	1	1	5	7	69	92
IS	2	3	1	1	10	13	62	83
Significance level	Df=18		t-value =0.63		Observed Significance = 0.53NS			

The results in Table 22 further reveal that 95% of PFG members contacted the extension staff at least thrice a month, while 65% of non-PFG members contacted the extension staff at least once a month. This means that, there is closer contact relationship between extension staff and PFG members than with non-PFG members. Similarly, more PFG members contacted the research staff (84%) and input suppliers (65%) at most twice per cropping season, than non-PFG members (13% and 7%).

From the same results in Table 22, it is interesting to note that, while all PFG members contacted the input suppliers, the majority of non-PFG members (83%) did not contact them. However, the majority of both PFG and non-PFG members contacted both the Member of Parliament and the District Commissioner respectively at most twice per cropping season.

The analysis indicates that, there is no significant statistical difference in the frequency of contacts among the key actors. This was contributed by Farmers Field Days and Demonstraion Farms which were used by NSPFP staff to forge linkages and contacts among the key actors in agricultural production. The results, generally indicate that, the stronger the linkage among the actors the more the frequency of contacts. The frequency of researchers and input suppliers contacting non-PFG members was less because the linkages among them was not strong enough to facilitate contacts.

4.5.6 Purpose and usefulness of contacts among the key actors

4.5.6.1 Purpose of contacts

Having seen the knowledge of respondents on key actors, the premises of contacts and the frequency of contacts among the key actors, the respondents were further asked to mention the purposes of contacting the key actors. The results are presented in Table 23. The majority of PFG and non-PFG members (80%) mentioned the verification of the potential of using improved rice technologies as the purposes of contacting the policy makers.

Table 23: Distribution of Respondents by Purpose of Contacting the Key Actors

Key actors/ Respondents	To discuss on rice marketing problems		To learn on improved rice technologies		To select improved rice technologies		To plan for the cropping seasons		To discuss on agricultural inputs		To verify the potential of using improved rice technologies	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
PFG Members (n=75)												
MP	0	0	0	0	0	0	0	0	0	0	75	100
DC	0	0	0	0	0	0	2	3	8	11	65	87
DALDO	2	3	5	7	2	3	2	3	2	3	62	83
DEO	2	3	11	15	17	23	11	15	4	5	30	40
DS	8	11	3	4	7	9	11	15	10	13	36	48
DAO	3	4	7	9	19	25	2	3	2	3	42	56
DW	15	20	0	0	6	8	1	1	20	27	33	44
ES	10	13	10	13	17	23	10	13	10	13	18	24
RS	0	0	14	19	30	40	0	0	0	0	31	41
IS	0	0	0	0	10	13	5	7	30	40	30	40
Non-PFG member (n=75)												
MP	0	0	0	0	0	0	0	0	0	0	75	100
DC	0	0	0	0	0	0	2	3	3	4	70	93
DALDO	2	3	0	0	0	0	0	0	3	4	70	93
DEO	0	0	0	0	0	0	4	5	1	1	70	93
DS	4	5	0	0	0	0	0	0	5	7	66	88
DAO	0	0	1	1	0	0	1	1	0	0	73	97
DW	4	5	0	0	0	0	4	5	0	0	67	89
ES	2	3	2	3	0	0	1	1	0	0	70	93
RS	0	0	4	5	0	0	0	0	0	0	71	95
IS	0	0	0	0	0	0	0	0	0	0	75	100
Df	18		18		-		18		18		18	
t-value	1.61		2.51		-		2.09		2.37		-4.78	
Signif. level	0.124NS		0.02*		-		0.051NS		0.029*		0.0009*	

Whereas 63% of PFG members mentioned selection of improved rice technologies as the purpose of contacting the research and extension staff, none of the non-PFG members mentioned that as the purpose. Research and extension staff are mentioned by 32% of PFG and 8% of non-PFG members respectively as the key partners in the learning of improved rice technologies and practices. When the PFG members are contacting the extension staff for various purposes, the non-PFG members are contacting the extension staff for verifying the potential of using improved rice technologies (93%) and to a lesser extent (6%) for learning on improved rice technologies and discussing on rice marketing problems.

The research staff are contacted the PFG members mainly to verify the potential of using improved rice technologies (41%), selecting the improved rice technologies (40%) and learning on improved rice technologies and practices (19%). On the other hand, the researchers contacted the non-PFG members to verify the potential of using improved rice technologies (95%) and to a lesser extent (5%) to learn on improved rice technologies and practices. The research staff therefore did not have the opportunity to contact the non-PFG members on the selection of improved rice technologies. This activity is usually done during PFG meetings of which the non-PFG members are not yet organized into PFG. While all non-PFG members contacted input suppliers for one purpose (verifying the potential of using improved rice technologies), 93% of PFG members contacted them for three purposes (selecting, verifying the improved rice technologies and discussing on procurement and distribution of agricultural inputs). The statistical analysis reveals a significant difference between

PFG and non-PFG members on the purposes of learning and selecting (0.02), discussing on agricultural inputs (0.029) and verifying the potential of using improved rice technologies and practices (0.0009).

Planning for the cropping seasons and discussing on rice marketing problems as mentioned by the respondents could not show any significant statistical difference (i.e 0.051 and 0.124) between PFG and non-PFG members. Generally, the results in Table 23, have disclosed the organizational difference that existed between the PFG and non-PFG members which have contributed to a slight variation in establishment of linkages and contacts among key actors. Unlike non-PFG members, PFG members have organized themselves into PFGs which facilitated establishment of strong linkages and contacts among the key actors.

4.5.6.2 Usefulness of contacts

When the respondents were asked to rate the usefulness of contacting the key actors, all PFG members found it to be very useful, supported by 89% of non-PFG members. When asked about the usefulness of contacts, the majority (59%) of PFG members mentioned access to new information, sensitized to adopt improved rice technologies, effective exchange of ideas and experiences, getting a forum to present ideas and pressing problems and creation of premises to participate in problem solving with other key actors as some of the benefits. The majority (82%) of non-PFG members mentioned assistance to solving rice production problems, accessing to new information, sensitized to adopt improved rice technologies and creation of the

premises to participate in problem solving with other key actors, as some the benefits. While all the PFG members felt the contacts among key actor to be advantageous, 11% of non-PFG members felt to be disadvantageous. Some of the reasons given by non-FPG members are: farmers don't get immediate benefits, farmers are cheated by some actors by giving false promises and farmers don't realize any improvement in their living standards. However, it is noteworthy that, both PFG and non-PFG members are acknowledging access to new information, sensitization to adoption of the improved rice technologies and encouragement to participate in problem solving with other actors under NSPFP. NSPFP has been a challenge to other extension programmes which use the linear approach to farmers needs and aspirations.

Under the linear model, the generation, transfer and utilization of technologies are sequential, but without any interaction or feedback loops. There is a clear division of labour and no synergy (Eponou, 1996). Research *regenerates* technologies, extension *transfers* to farmers and farmers *use* the technologies. There is neither collective responsibility for the outcome of a joint effort, nor does research see the generation of practical technologies as the required output of its efforts (Eponou, 1996). Infact, Eponou (1996) was puzzled because the expected increase in the flow of agricultural technologies responsive to the needs and production conditions of resource-poor farmers in Sub-Sahara Africa has not occurred inspite of considerable investments in research and extension services.

Weak linkages and unfavourable agricultural policies are identified to be among the bottlenecks that have hindered the required exchange of information, knowledge and active participation of the key actors in the technology system. He recommended that linkages between and among the actors, be built into the model because all tasks are done collaboratively. Roling and Seeger (1992), likewise cautioned that the efficacy of linkages will very much depend on the quality of the human resource involved. If the human resource "mix" (personal attributes, attitudes, behaviours, motivations, interests and goals) in a technology system is not right, people may not be able to realize the usefulness of working together.

4.5.7 Conclusions

The results pertaining to attitudes of key actors interacting to address rice production constraints were discussed and three conclusions can be made.

1. Among the ten key actors who had contacts with smallholder farmers, extension staff are the most known. This suggests that extension staff are more closer to farmers than the other actors.

2. Farmers Field Days are crucial places for agricultural extension to verify the potential of using improved agricultural technologies and also to create awareness on the interdependence among the key actors.

3. Helping farmers organize themselves into groups facilitates establishment of stronger ties and contacts among different partners. This is found useful as they promote participatory problem solving and steady access to new information and knowledge to the needy people.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In view of the results, discussions and conclusions from the specific sections of the study in the previous Chapter, some major conclusions and recommendations can be drawn with regard to the contribution of NSPFP participatory approaches in improving smallholder rice farmers adoption of rice innovations and yields in Mang'ula Division in Kilombero District.

5.1.1 Major conclusions

1. The study found that, some technologies and practices were adopted while others were rejected by smallholder rice farmers due to their characteristics. The adopted technologies and practices were proper seedbed preparation, use of TXD 88, row rice planting by use of manilla strings, split fertilizer application and use of rice sickles. Their adoption were due to relative advantage, triability and observability. Wooden row space markers, rotary weeders and foot paddy threshers were the rejected technologies due to their complexity and inconsistance with past experiences.
2. The rice yields increased due to adoption of improved rice technologies and practices which were disseminated by NSPFP in a package form. The GDFs played the consultant roles in the dissemination and adoption of the rice

innovations to needy farmers to complement the efforts of VEOs. However, the ecological and socio-economic factors were identified by the study to have taken a leading role in preventing the transfer and adoption of improved rice technologies and practices.

3. The study found that, the attitudes of key actors with respect to contacts to address small holder rice farmers production constraints were positive. The key actors appreciated contacts to facilitate access to new information, sensitization to adoption of improved rice technologies and encouragement to participate in problem solving. The NSPFP consolidated PFGs established a central base of agricultural extension services where contacts amongst key actors in agricultural production were promoted and sustained.

The study also revealed that, the extension staff were very instrumental in initiating the contacts among the key actors in agricultural production despite their lack of adequate logistics and motivation.

The devotion of NSPFP's efforts in promoting FFDs, PFGMs, DFs, Workshops and Seminars were found by the study to enhance contacts and participation of the key actors in the development, transfer and utilization of agricultural innovations.

5.1.2 Recommendations

Basing on these major conclusions from the study, the following recommendations are suggested in order to improve the performance of NSPFP and other related agricultural programmes.

1. The agricultural programmes should focus on smallholder farmers between the age of 26 and 50 years (a very important segment of the rural population) if active participation is to be realized.
2. Extension and research staff and the smallholder farmers should explore critically on all attributes of the agricultural innovations before selection, transfer and adoption. This is important in order to make sure that the selected technologies and practices meet the specific needs of the specific clientele at their respective localities.
3. Research and extension staff should be conversant with the ecological and socio-economic factors of the smallholder farmers before they involve them and other key actors in the development and /or selection of improved agricultural technologies and practices. The selected technical packages will therefore be feasible and easily transferred and successfully adopted by the smallholder farmers.
4. The extension services should work towards forming and consolidating more PFGs. NSPFP made more contacts with smallholder rice farmers than other agricultural extension programmes because it used the PFGMs as means of contacting many smallholder farmers and other key actors at a single point in

time. The PFGs improve the extension contact and institute the culture of working together amongst the key actors in agricultural development.

5. PFGs be used to establish village-based input centres, reliable marketing channels of the agricultural products and rural banks to enable smallholder farmers deposit and borrow from the banks in order to improve their purchasing power and sustain their group membership.

6. The MAC should provide adequate support and organise innovative training to extension staff. The provision of good packages and reliable transport will motivate the extension staff to work with their clienteles. The innovative training also will enable the extension staff to deal with multifaceted problems they encounter in their work and acquire more critical thinking and communication skills to the knowledge and skills they have in agriculture.

7. It is a high time for NSPFP and other agricultural programmes to reconsider and give more thrust to trained GDFs as an important participatory approach in smallholder farmers agricultural development.

The agricultural sector can only be transformed if more GDFs are trained to complement the efforts of extension staff in accelerating the flow of improved agricultural technologies to smallholder farmers. Village-based training is necessary as it will create more training opportunities to GDFs and other smallholder farmers at the grassroots level and hence narrow the observed farmers training wide gap.

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APPENDICES

APPENDIX 1

THE ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN MOROGORO REGION: THE CASE OF NATIONAL SPECIAL PROGRAMME ON FOOD PRODUCTION (NSPFP) IN MANG'ULA DIVISION, KILOMBERO DISTRICT

1.0 INTERVIEW SCHEDULE FOR PFG MEMBERS IN MANG'ULA DIVISION

(a) Date of Interview.....

(b) Name of Respondent.....

(c) Name of Farmer's Group.....

(d) Name of the Village.....

(e) Number of Respondent.....

(f) Name of Interviewer.....

2.0 INTRODUCTION

The purpose of the study is to examine the extent to which NSPFP participatory approaches have contributed towards increased rice production through the dissemination of selected improved rice technologies and practices in the Division. You being a PFG Member among the formed and consolidated PFGs in Mang'ula, you have been specifically selected to provide us with information about rice production and the

approaches as used by NSPFP. The findings of the study will help the government and other rural development agencies to improve their extension approaches they use to advise small holder farmers. I kindly request for your cooperation with regard to this exercise. The information obtained from you will be strictly confidential.

3.0 SOCIAL DEMOGRAPHIC INFORMATION OF PFG MEMBERS

(a) How old are you?

(1) 18 - 25 years (.....)

(2) 26 - 33 years (.....)

(3) 34 - 41 years (.....)

(4) 42 - 50 years (.....)

(5) Above 50 years (.....)

(b) What is your gender?

(1) Male (.....)

(2) Female (.....)

(c) What is your Marital Status?

(1) Married (.....)

(2) Single (.....)

(3) Divorced (.....)

(4) Widow (.....)

(5) Separated (.....)

(d) Who normally helps you with labour on farming activities?

(1) Own family members (.....)

(2) Hired labour (.....)

(3) Group members (.....)

(4) Relatives (.....)

(5) Others (specify).....

(e) What crops are your main family food source?

(1) Rice (.....)

(2) Maize (.....)

(3) Pulses (.....)

(4) Banana (.....)

(5) Others (Specify).....acres

(f) What is your average farm size under rice?

(1) 0.5 - 1.0 acres (.....)

(2) 1.1 - 1.5 acres (.....)

(3) 1.6 - 2.5 acres (.....)

(4) 2.6 - 4.0 acres (.....)

(5) Above 4.0 acres (specify)..... acres

(g) What is your average farm size under maize ?

(1) 0.5-1.0 acres (.....)

(2) 1.1-1.5 acres (.....)

(3) 1.6-2.5 acres (.....)

(4) 2.6-4.0 acres (.....)

(5) Above 4.0 acres (Specify)..... acres

(h) What is your level of education ?

(1) Adult education (.....)

(2) Primary education (.....)

(3) Secondary education (.....)

(4) Post secondary education (.....)

(5) Non Formal education (.....)

(6) Others (specify).....

(i) Have you ever attended any formal training in agriculture or livestock ?

(1) Yes (.....)

(2) No (.....)

(j) If answer is Yes in question (3i) above, which course ?

(1) Rice production technology (.....)

(2) Grain storage technology (.....)

(3) Rice irrigation technology (.....)

(4) Animal production (.....)

(5) Bunds construction (.....)

(6) No course at all (.....)

(l) Where was the training held ?

(1) Ifakara - Parish Hall(IPH) (.....)

(2) Kilimanjaro Agricultural Training Centre (KATC) (.....)

(3) Msolwa Farmers Training Centre(MFTC) (.....)

(4) Sokoine University of Agriculture(SUA) (.....)

(5) Kilombero Agricultural Training Institute(KATRIN) (.....)

(6) Others (specify).....

4.0 SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT THE PFG MEMBERS HAVE ADOPTED IN MANG'ULA

(a) Have you heard of improved rice technologies and practices?

(1) Yes (.....)

(2) No (.....)

(b) Which of the following improved rice technologies and practices have you adopted in your farm last cropping season? Just respond Yes or No and mention the source.

Improved rice technology or practice	Yes (i)	No (ii)	Source (iii)				
			NSPFP (1)	PNP (2)	NALERP (3)	SEP (4)	Others (5)
1. Proper seedbed preparation	.....	.....	.....	.....	.....	.....	.....
2. Use of HYV TXD 85 or 88	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice (20x20cm)	.....	.....	.....	.....	.....	.....	.....
4. Use of graduated wooden row space markers	.....	.....	.....	.....	.....	.....	.....
5. Construction of buds	.....	.....	.....	.....	.....	.....	.....
6. Use of Rotary weeders for w eed control.	.....	.....	.....	.....	.....	.....	.....
7. Use of Manilla Strings	.....	.....	.....	.....	.....	.....	.....
8. Use of herbicides	.....	.....	.....	.....	.....	.....	.....
9. Split application of fertilizer	.....	.....	.....	.....	.....	.....	.....
10. Integrated Pest Management	.....	.....	.....	.....	.....	.....	.....
11. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....
12. Use of foot paddy threshers	.....	.....	.....	.....	.....	.....	.....
13. Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....

(c) What are the reasons for you adopting some of the above technologies and practices?

Improved rice technology or practice	Previous technology or practice is not better (i)		Technology or practice is consistent with past (ii)		Technology or practice is simple. (iii)		Technology or practice is triable (iv)		Technology or practice is obser- vable (v)	
	Yes (1)	No (2)	Yes (1)	No (2)	Yes (1)	No (2)	Yes (1)	No (2)	Yes (1)	No (2)
1. Proper seed bed preparation										
2. Use of HYV TXD 85 or 88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice(20x20cm)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Use of wooden row space Markers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5. Construction of buds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6. Use of Rotary weeders	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7. Use of Manilla strings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8. Use of herbicides	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9. Split application of fertilizers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10. Integrated Pest Mgnt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12. Use of Foot paddy threshers.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13. Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

(d) What are the reasons for you not adopting some of the above improved rice technologies and practices?

Improved rice technology or practices	Previous technology or practice is better		Technology or practice is inconsiste nt with past		Difficulty in technology or practice		Not triable technology or practice		Not observable technology or practice	
	Yes (1)	No (2)	Yes (1)	No (2)	Yes (1)	No (2)	Yes (1)	No (2)	Yes (1)	No (2)
1. Proper seed bed preparation	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Use of HYV TXD 85 or 88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice(20X20cm)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4.Use of wooden row space Markers.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5. Construction of buds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6. Use of Rotary weeders	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7. Use of Manilla Strings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8. Use of herbicides	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9. Split application of fertilizers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10. Integrated Pest Mgunt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12. Use of Foot paddy threshers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13. Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

5.0 EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG PFG MEMBERS DUE TO NSPFP PARTICIPATORY APPROACHES IN MANG'ULA

(a) Do you know your village extension officer (VEO) ?

(1) Yes (.....)
(2) No (.....)

(b) Between the VEO and Group Demonstration Farmer (GDF) who visits you more frequently ?

(1) VEO (.....)
(2) GDF (.....)

(c) How frequent does the VEO visit you ?

(1) Once a week (.....)
(2) Once a month (.....)
(3) Thrice a week (.....)
(4) We visit VEO on need basis (.....)
(5) No visit at all (.....)

(d) How about the GDF?

(1) Once a week (.....)
(2) Once a month (.....)
(3) Thrice a week (.....)
(4) We visit GDF on need basis (.....)
(5) No visit at all (.....)

(e) Which of the following approaches does the extension agents use when they want to facilitate you to adopt the improved rice technologies or practices? Just respond more frequent, frequent, less frequent and not at all.

Approaches	At least thrice a month (i)	At least once a month (ii)	At most twice per season (iii)	Not at All (iv)
1. PFG Meetings	.....	.....	.....	.....
2. Field Demonstrations	.....	.....	.....	.....
3. Workshops/Seminars	.....	.....	.....	.....
4. Field Days	.....	.....	.....	.....
5. Trained Demonstration Farmers	.....	.....	.....	.....
6. Farm visits	.....	.....	.....	.....
7. Home visits	.....	.....	.....	.....
8. Leaflets	.....	.....	.....	.....

(f) From your experience with rice growing in this village how do you rate your adoption of improved rice technologies and practices.

(1)	Increased adoption	(.....)
(2)	Decreased adoption	(.....)
(3)	No change in adoption	(.....)

(g) Is there any improvement in rice yield per acre in your farm since NSPFP started to operate in this village? Please respond to any of the following

(1)	Increased	(.....)
(2)	Decreased	(.....)
(3)	No change at all	(.....)

(h) Which one of the following might be your rice yield range per acre last cropping season?

(1)	4 - 8 bags	(.....)
(2)	9 - 13 bags	(.....)
(3)	14 - 20 bags	(.....)
(4)	21 - 25 bags	(.....)
(5)	26 - 40 bags	(.....)

(i) Are there any factors that have prevented you from adequately participating in selection and adoption of the NSPFP recommended technologies and practices?

(1)	Yes	(.....)
(2)	No	(.....)

(j) If the answer is Yes in (5i) above which of the following factors do you agree, disagree or you don't know?

Factor	Agree (i)	Disagree (ii)	I don't know (iii)
1. Inadequate Money to buy inputs	.....	.....	.....
2. Inadequate Labour to effectively apply the technologies/practices	.....	.....	.....
3. Other obligations that compete for the recommended technologies/ practices	.....	.....	.....
4. Recommended technologies /practices are too expensive	.....	.....	.....
5. Recommended technologies/practices are not available.	.....	.....	.....
6. Recommended technologies/ practices do not improve rice production.	.....	.....	.....
7. Lack of markets for paddy	.....	.....	.....
8. Low prices for paddy	.....	.....	.....
9. Lack of transport facility to and from the field	.....	.....	.....
10. Unreliable stockist	.....	.....	.....
11. Inadequate credit facility	.....	.....	.....
12. In adequate advisefromVEO	.....	.....	.....
13. Unfavourable weather conditions	.....	.....	.....
14. GDF not Cooperative	.....	.....	.....
15. Inadequate tractors to plow the fields	.....	.....	.....

(k) Have group(s) facilitated you in overcoming some of the above factors you mentioned in (5j)?

(1) Yes (.....)
(2) No (.....)

(l) If the answer in Yes/No in (5k) above how ?

(1) .....

(2) .....

(3) .....

6.0 ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS SMALL HOLDER RICE FARMERS PRODUCTION CONSTRAINTS

(a) Do you know the following people? Just answer Yes or No.

Title of the person	Yes	No
1. Member of Parliament (MP)	.....	.....
2. District Commissioner (DC)	.....	.....
3. District Agriculture and Livestock Development Officer (DALDO)	.....	.....
4. District Extension Officer (DEO)	.....	.....
5. Divisional Secretary (DS)	.....	.....
6. District Action Officer NSPFP (DAO)	.....	.....
7. Ward Councillor(DW)	.....	.....
8. Extension staff (ES)	.....	.....
9. Research Staff (RS)	.....	.....
10. Input Supplier (IS)	.....	.....

(b) At which of the following places, did you meet the above people you have just mentioned in (6a) last cropping season?

Title of the person	Meeting Place			
	Demo Farm (i)	PFG Meeting (ii)	Workshop/ Seminar (iii)	Field Day (iv)
1. MP	.....	.....	.....	.....
2. DC	.....	.....	.....	.....
3. DALDO	.....	.....	.....	.....
4. DEO	.....	.....	.....	.....
5. DS	.....	.....	.....	.....
6. DAO	.....	.....	.....	.....
7. DW	.....	.....	.....	.....
8. ES	.....	.....	.....	.....
9. RS	.....	.....	.....	.....
10. IS	.....	.....	.....	.....

(c) Who organized your meeting together with the above people in where you have mentioned in (6b) above?

(1) NSPFP Extension Staff (.....)
(2) PFG Chairperson (.....)
(3) PFG Secretary (.....)
(4) Divisional Secretary (.....)
(5) Some one else please specify).....

(d) What was the purpose of your working together with each of the above people you have mentioned in (6a).

People	The purpose					
	To discuss on rice marketing problems (i)	To learn on improved rice technolo-gies and practices (ii)	To select the improved rice techno-logies and practices (iii)	To plan for the following cropping season (iv)	To discuss on input procurement, distribution and repayment of pending loans (v)	To verify the potential of using improved rice techno-logies and practices (vi)
i) MP	.....	.....	.....	.....	.....	.....
2) DC	.....	.....	.....	.....	.....	.....
DALDO	.....	.....	.....	.....	.....	.....
4) DEO	.....	.....	.....	.....	.....	.....
5) DS	.....	.....	.....	.....	.....	.....
6) DAO	.....	.....	.....	.....	.....	.....
7) DW	.....	.....	.....	.....	.....	.....
8) ES	.....	.....	.....	.....	.....	.....
9) RS	.....	.....	.....	.....	.....	.....
10) IS	.....	.....	.....	.....	.....	.....

(e) How frequent do you meet with each of the above people mentioned in (6a) to address rice production constraints? Please respond at least thrice a month, at least once a month, at most twice per season and not at all.

Title of the Person	At least thrice a month	At least once a month	At most twice per season	Not at All
1. MP	.....	.....	.....	.....
2. DC	.....	.....	.....	.....
3. DALDO	.....	.....	.....	.....
4. DEO	.....	.....	.....	.....
5. DS	.....	.....	.....	.....
6. DAO	.....	.....	.....	.....
7. DW	.....	.....	.....	.....
8. ES	.....	.....	.....	.....
9. RS	.....	.....	.....	.....
10. IS	.....	.....	.....	.....

(f) How would you rate the usefulness of you working together with the above people mentioned in (6a) in addressing rice production constraints and imparting of knowledge in rice production?

(1) Very useful (.....)
(2) Less useful (.....)
(3) Not useful (.....)

(g) Please explain

.....
.....
.....
.....

Thank You Very Much for Your Cooperation

APPENDIX II

THE ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN MOROGORO REGION: A CASE STUDY OF NATIONAL SPECIAL PROGRAMME ON FOOD PRODUCTION (NSPFP) IN MANG'ULA DIVISION, KILOMBERO DISTRICT

1. INTERVIEW SCHEDULE FOR NON-PFG MEMBERS IN MANG'ULA DIVISION

(a) Date of Interview.....
(b) Name of Respondent.....
(c) Name of the village.....
(d) Number of Respondent.....
(e) Name of Interviewer.....

2. INTRODUCTION

The purpose of the study is to examine the extent to which NSPFP participatory approaches have contributed towards increased rice production through the dissemination of selected improved rice technologies and practices in the Division. You being a smallholder farmer who grow rice and closer to PFG members in this village, you have been specifically selected to provide us with information about rice production and the approaches as used by NSPFP. The findings of the study will help the government and other rural development agencies to improve their extension approaches they use to advise smallholder farmers. I kindly request for your cooperation with regard to this exercise. The information obtained from you will strictly be confidential.

3. SOCIAL DEMOGRAPHIC INFORMATION OF NON-PFG MEMBERS

(a) How old are you?

(1)	18 - 25	years	(.....)
(2)	26 - 33	years	(.....)
(3)	34 - 41	years	(.....)
(4)	42 - 50	years	(.....)
(5)	Above 50	years	(.....)

(b) What is your gender?

(1)	Male	(.....)
(2)	Female	(.....)

(c) What is your marital status?

(1)	Married	(.....)
(2)	Single	(.....)
(3)	Divorced	(.....)
(4)	Widow	(.....)
(5)	Separated	(.....)

(d) Who usually helps you with labour on farming activities?

(1)	Own family members	(.....)
(2)	Hired labour	(.....)
(3)	Relatives	(.....)
(4)	Friends	(.....)
(5)	Others (specify).....	

(e) What crops are your main family food source?

(1)	Rice	(.....)
(2)	maize	(.....)
(3)	Pulses	(.....)
(4)	Banana	(.....)
(5)	Others (specify).....	

(f) What is your average farm size under rice?

(1)	0.5 - 1.0 acres	(.....)
(2)	1.1 - 1.5 acres	(.....)
(3)	1.6 - 2.5 acres	(.....)
(4)	2.6 - 4.0 acres	(.....)
(5)	Above 4.0 acres (specify).....	

(g) What is your average farm size under maize?

(1) 0.5-1.0 acres (.....)
(2) 1.1-1.5 acres (.....)
(3) 1.6-2.5 acres (.....)
(4) 2.6-4.0 acres (.....)
(5) Above 4.0 acres(Specify)}.....

(h) What is your level of education?

(1) Adult education (.....)
(2) Primary education (.....)
(3) Secondary education (.....)
(4) Post Secondary education (.....)
(5) No formal education (.....)
(6) Others (specify).....

(i) Have you ever attended any formal training in agriculture or livestock?

(1) Yes (.....)
(2) No (.....)

(j) If answer is Yes in question (3i) above which course?

(1) Rice production technology (.....)
(2) Grain storage technology (.....)
(3) Rice irrigation technology (.....)
(4) Animal production (.....)
(5) Bunds construction (.....)
(6) No course at all (.....)

(k) Where was the training held?

(1) Ifakara Parish Hall (IPH) (.....)
(2) Kilimanjaro Agricultural Training Centre (KATC) (.....)
(3) Msolwa Farmers Training Centre (MFTC) (.....)
(4) Sokoine University of Agriculture (SUA) (.....)
(5) Kilombero Agricultural Training Institute (KATRIN) (.....)
(6) Others (specify).....

4. SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT THE NON-PFG MEMBERS HAVE ADOPTED IN MANG'ULA

(a) Have you heard of improved rice technologies and practices?

(1) Yes (.....)
(2) No (.....)

(b) Which of the following improved rice technologies have you adopted in your farm? Just respond Yes or No and mention the source.

Improved technology	Yes (i)	No (ii)	Source (iii)				
			NSPFP (1)	PNP (2)	NALERP (3)	SEP (4)	OTHERS (5)
1. Proper seedbed preparation	.....	.....	.....	.....	.....	.....	.....
2. Use of HYV TXD 85/88	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice (20x20 cm)	.....	.....	.....	.....	.....	.....	.....
4. Use of wooden row space marker	.....	.....	.....	.....	.....	.....	.....
5. Bunds Construction	.....	.....	.....	.....	.....	.....	.....
6. Use of rotary weeders for weed control	.....	.....	.....	.....	.....	.....	.....
7. Use of manila strings	.....	.....	.....	.....	.....	.....	.....
8. Use of herbicides	.....	.....	.....	.....	.....	.....	.....
9. Split fertilizer application	.....	.....	.....	.....	.....	.....	.....
10. Integrated pest management	.....	.....	.....	.....	.....	.....	.....
11. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....
12. Use of foot paddy threshers	.....	.....	.....	.....	.....	.....	.....
13. Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....

(c) What are the reasons for you adopting some of the above technologies and practices?

Improved rice technology/practice	Previous Technology/ Practice is better (i)	Technology/ Practice is consistent with past (ii)	Techno-logy/prac-tice is simple (iii)	Technology/ practice is triable (iv)	Techno-logy/prac-tice is observable (v)
	Yes No (1) (2)	Yes No (1) (2)	Yes No (1) (2)	Yes No (1) (2)	Yes No (1) (2)
1. Proper seedbed preparation	.....	.....	.....	.....	.....
2. Use of HYV TXD 85/88	.....	.....	.....	.....	.....
3. Row planting of rice	.....	.....	.....	.....	.....
4. Use of wooden row space markers	.....	.....	.....	.....	.....
5. Construction of bunds	.....	.....	.....	.....	.....
6. Use of Rotary weeders to control weeds	.....	.....	.....	.....	.....
7. Use of manilla strings	.....	.....	.....	.....	.....
8. Use of herbicides	.....	.....	.....	.....	.....
9. Split fertilizer application	.....	.....	.....	.....	.....
10. Integrated Pest Mgnt	.....	.....	.....	.....	.....
11. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....
12. Use of foot paddy threshers	.....	.....	.....	.....	.....
13. Appropriate rice grain storage	.....	.....	.....	.....	.....

(d) What are the reasons for you not adopting some of the above improved rice technologies and practices?

Improved rice thechnoloty/practice	Previous Technology/ Practice is not better (i)	Technology/ Practice is inconsistent with past (ii)	Difficulty in techno-logy/prac tice (iii)	Not triable technology/p ractice (iv)	Not obser vable technology/ practice (v)
	Yes No (1) (2)	Yes No (1) (2)	Yes No (1) (2)	Yes No (1) (2)	Yes No (1) (2)
1. Proper seedbed preparation	.....	.....	.....	.....	.....
2. Use of HYV TXD 85/88	.....	.....	.....	.....	.....
3. Row planting of rice (20x20cm)	.....	.....	.....	.....	.....
4. Use of wooden row space markers	.....	.....	.....	.....	.....
5. Construction of bunds	.....	.....	.....	.....	.....
6. Use of Rotary weeders to control weeds	.....	.....	.....	.....	.....
7. Use of manilla Strings	.....	.....	.....	.....	.....
8. Use of herbicides	.....	.....	.....	.....	.....
9. Split fertilizer application	.....	.....	.....	.....	.....
10. Integrated Pest Mgnt	.....	.....	.....	.....	.....
11. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....
12. Use of foot paddy threshers	.....	.....	.....	.....	.....
13. Appropriate rice grain storage	.....	.....	.....	.....	.....

5. EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG NON-PFG MEMBERS DUE TO NSPFP PARTICIPATORY APPROACHES IN MANG'ULA

(a) Do you know your village extension officer (VEO)?

(1) Yes (.....)
(2) No (.....)

(b) How frequent does your VEO visit you?

(1) Once a week (.....)
(2) Once a month (.....)
(3) Thrice a week (.....)
(4) We visit VEO on need basis (.....)
(5) No visit at all (.....)

(c) Which of the following approaches does the extension agents frequently use when they want to facilitate you to adopt the improved rice technologies and practices last cropping season? Just respond at least thrice a month, at least once a month, at most twice per season and not at all.

Approaches	At least thrice a month (i)	At least once a month (ii)	At most twice per season (iii)	Not at All iv)
1. PFG Meetings	.....	.....	.....	.....
2. Field Demonstrations	.....	.....	.....	.....
3. Workshops/Seminars	.....	.....	.....	.....
4. Farmers Field Days	.....	.....	.....	.....
5. Trained Demonstration Farmers	.....	.....	.....	.....
6. Farm visits	.....	.....	.....	.....
7. Home visits	.....	.....	.....	.....
8. Leaflets	.....	.....	.....	.....

(d) From your experience with rice growing in this village how do you rate your adoption of improved rice technologies and practices?

(1) Increased adoption (.....)
(2) Decreased adoption (.....)
(3) No change in adoption (.....)

(e) Is there any improvement in rice yields per acre in your farm since NSPFP started to operate in this village? Please respond to any of the following.

(1) Increased (.....)
(2) Decreased (.....)
(3) No change at all (.....)

(f) Which one of the following might be your rice yield range per acre last cropping season?

(1) 4 - 8 bags (.....)
(2) 9 - 13 bags (.....)
(3) 14 - 20 bags (.....)
(4) 21 - 25 bags (.....)
(5) 26 - 40 bags (.....)
(6) None of the above (specify).....bags.

(g) Are there any factors that have prevented you from not adequately adopt the NSPFP recommended rice technologies and practices?

(1) Yes (.....)
(2) No (.....)

(h) If the answer is Yes in (5g) above which of the following factors do you agree, disagree or you don't know?

Factors	Agree (i)	Disagree (ii)	Idon't know (iii)
1. Inadequate money to buy inputs	.....	.....	.....
2. Inadequate labour to effectively apply the technologies/practices	.....	.....	.....
3. Other obligations that compete for the recommended technologies/practices	.....	.....	.....
4. Recommended technologies/practices are too expensive	.....	.....	.....
5. Recommended technologies are not available.	.....	.....	.....
6. Recommended technologies/practices do not improve rice production	.....	.....	.....
7. Lack of markets for paddy	.....	.....	.....
8. Low prices for paddy	.....	.....	.....
9. Lack of transport facility to and from the field	.....	.....	.....
10. Unreliable stockist	.....	.....	.....
11. Inadequate credit facility	.....	.....	.....
12. Inadequate advise from VEO	.....	.....	.....
13. Unfavourable weather conditions	.....	.....	.....
14. GDF not cooperative	.....	.....	.....
15. Inadequate tractors to plow the fields	.....	.....	.....

(i) Are you aware of the existence of rice PFGS in your village?

(1) Yes (.....)
(2) No (.....)

(j) What motivated you to the extent that you want to join the rice PFGS?

(1).....
(2).....

(k) What discouraged you to the extent that you don't want to join the rice PFGS?

(1).....

(2).....

(l) Are there any noticeable differences between you and farmers who are already in rice PFGS?

(1) Yes (.....)

(2) No (.....)

(m) If the answer is Yes in (5l) above, mention any 3 main differences.

(1).....

(2).....

(3).....

6. ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS RICE SMALLHOLDER FARMERS PRODUCTION CONSTRAINTS

(a) Do you know the following people? Just answer Yes or No

Title of the person	Yes (i)	No (ii)
1. Member of Parliament (MP)	.....	.....
2. District Commissioner (DC)		
3. District Agriculture and Livestock Development officer (DALDO)	.....	.....
4. District Extension Officer (DEO)	.....	.....
5. Divisional Secretary (DS)	.....	.....
6. District Action Officer-NSPFP (DAO)	.....	.....
7. Ward Councillor (DW)	.....	.....
8. Extension Staff (ES)	.....	.....
9. Research Staff (RS)	.....	.....
10.Input supplier (IS)	.....	.....

(b) At which of the following places, did you meet the above people you have mentioned in (6a) last cropping season?

Title of the person	Meeting Place			
	Demo farm (i)	PFG Meeting (ii)	Workshop/ seminar (iii)	Field Day (iv)
1. MP	.....	.....	.....	.....
2. DC	.....	.....	.....	.....
3. DALDO	.....	.....	.....	.....
4. DEO	.....	.....	.....	.....
5. DS	.....	.....	.....	.....
6. DAO	.....	.....	.....	.....
7. DW	.....	.....	.....	.....
8. ES	.....	.....	.....	.....
9. RS	.....	.....	.....	.....
10. IS	.....	.....	.....	.....

(c) Who organized your meeting together with the above people in where you have mentioned in (6b) above?

(1) NSPFP Extension Staff (.....)
(2) PFG Chairperson (.....)
(3) PFG Secretary (.....)
(4) Divisional Secretary (.....)
(5) Some one else (specify).....

d) What was the purpose of you working together with each of the above people you have mentioned in (6a)?

PEOPLE	THE PURPOSE					
	To discuss on rice marketing problem (i)	To learn on improved rice technologies and practices (ii)	To select the improved rice technologies and practices (iii)	To plan for the following cropping season (iv)	To discuss on input procurement, distribution and repayment of pending loans (v)	To verify the potential of using improved rice technologies and practices (vi)
1) MP	.....	.....	.....	.....	.....	.....
2) DC	.....	.....	.....	.....	.....	.....
3) DALDO	.....	.....	.....	.....	.....	.....
4) DEO	.....	.....	.....	.....	.....	.....
5) DS	.....	.....	.....	.....	.....	.....
6) DAO	.....	.....	.....	.....	.....	.....
7) DW	.....	.....	.....	.....	.....	.....
8) ES	.....	.....	.....	.....	.....	.....
9) RS	.....	.....	.....	.....	.....	.....
10) I S	.....	.....	.....	.....	.....	.....

(e) How frequent do you meet with each of the above people mentioned in (6a) to address rice production constraints? Please respond at least thrice a month, at least once a month, at most twice a season and not at all.

Title of the person	At least thrice a month (i)	At least once a month (ii)	At most twice a season (iii)	Not at All (iv)
1. MP	.....	.....	.....	.....
2. DC	.....	.....	.....	.....
3. DALDO	.....	.....	.....	.....
4. DEO	.....	.....	.....	.....
5. DS	.....	.....	.....	.....
6. DAO	.....	.....	.....	.....
7. DW	.....	.....	.....	.....
8. ES	.....	.....	.....	.....
9. RS	.....	.....	.....	.....
10. IS	.....	.....	.....	.....

(f) How would you rate the usefulness of you working together with the above people mentioned in (6a) in addressing rice production constraints and imparting knowledge in rice production?

(1) Very useful (.....)
(2) Less useful (.....)
(3) Not useful (.....)

(g) Please explain:

.....
.....
.....
.....

Thank You Very Much for Your Cooperation

APPENDIX III

ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN MOROGORO REGION: A CASE STUDY OF NATIONAL SPECIAL PROGRAMME ON FOOD PRODUCTION (NSPFP) IN MANG'ULA DIVISION, KILOMBERO DISTRICT

1. SEMI-STRUCTURED INTERVIEW SCHEDULES FOR KEY INFORMANTS IN MANG'ULA DIVISION

(a) Date of Interview.....
(b) Name of Respondent.....
(c) Working station.....
(d) Number of Respondent.....
(e) Name of Interviewer.....

2. INTRODUCTION

The purpose of the research is to examine the extent to which NSPFP participatory approaches have contributed towards increased rice production through the dissemination of selected improved rice technologies and practices in Kilombero District. You being involved in NSPFP activities in relation to smallholder farmers rice production in Mang'ula Division, I will appreciate if you can provide us with information about the selected improved rice technologies and practices and the approaches as used by extension staff. The findings of the study will help the government and other rural development agencies to improve their extension approaches they use to help the smallholder farmers. I kindly request for your cooperation with regard to this exercise. The information taken from you will be strictly confidential.

3. SOCIAL DEMOGRAPHIC INFORMATION OF KEY INFORMANTS

(a) Who is your employer?.....
(b) What is your gender?.....
(c) What is your age?.....
(d) What is your highest level of education?.....
(e) What is your proffession?.....
(f) Whatis your designation/occupation?.....
(g) How long have you been working with your Ministry/occupation? .....

(h) How long have you been working in this District/Division? .....

4. SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT SMALL HOLDER RICE FARMERS HAVE ADOPTED IN MANG'ULA AS A RESULT OF NSPFP PARTICIPATORY APPROACHES

(a) Are you aware of the NSPFP activities in the District/Division?

(b) Have you ever visited NSPFP villages in Mang'ula Division?

(c) What is your observation in the adoption of improved rice technologies among the smallholder rice farmers in groups and those not in groups.

(i) PFG members

(ii) Non-PFG members

(d) Can you mention a few improved rice technologies and practices that the smallholder rice farmers have adopted?

(1)

(2)

(3)

(d) What do you think are the possible reasons that encouraged/discouraged the smallholder rice farmers to adopt the rice innovations?

(i) <u>Encouraged:</u>

(1)

(2)

(3)

(4)

(ii) <u>Discouraged:</u>

(1)

(2)

(3)

(4)

(5).

5. EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG SMALLHOLDER RICE FARMERS IN MANG'ULA DUE TO NSPFP PARTICIPATORY APPROACHES

(a) In your visit to Mang'ula Division, which extension approaches are frequently used by extension officers?

(1)
(2)
(3)
(4)

(b) What is your comment on the extension approaches used?

(1)
(2)
(3)

(c) Basing on your experience of working in this District/Division how do you generally rate the transfer and adoption of improved rice technologies and practices among smallholder farmers in groups and those not in groups?

(i) PFG members: (1)
(2)

(ii) Non-PFG members: (1)
(2)

(d) What are the factors that have accelerated the transfer and adoption of selected improved rice technologies and practices amongst smallholder farmers?

(1)
(2)
(3)
(4)
(5)
(6)

(e) Have you observed or heard of factors that have impaired the transfer and adoption of the selected improved rice technologies and practices?

(1)
(2)
(3)
(4)
(5)
(6)

(f) Is there any increase in the yield of rice per acre among the smallholder rice farmers?

(g) Are you aware or informed of how many bags per acre for smallholder farmers in groups and those not in groups?

(i) PFG members
(ii) Non-PFG members

6. ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS RICE PRODUCTION CONSTRAINTS OF SMALLHOLDER FARMERS IN MANG'ULA

(a) Do you work with smallholder farmers, extension and research staff, and input supplier/policy makers?

(b) How frequent do you meet together with the above people you have just mentioned in (6a)?

(i) Smallholder Farmer
(ii) Extension Staff
(iii) Research Staff
(iv) Input Suppliers
(v) Policy makers

(c) In which places do you normally meet together?

(1)
(2)
(3)

(d) What is the purpose of you working together?

(1)

(2)

(3)

(4)

(e) How do you rate the usefulness of working together with the above partners in solving problems and imparting knowledge in rice production to smallholder farmers?

(f) Have the technical package advocated by NSPFP increased the rice smallholder farmers food production?

(g) Do you think the rice smallholder farmers will continue to use NSPFP selected improved rice technologies and practices after the programme ends?

(h) Are there any noticeable differences between NSPFP and other extension programmes operated or operating in this District/Division?

(i) If the answer is yes, mention the differences

(1)

(2)

(3)

(j) What in your recommendation(s) to Ministry of Agriculture and Food and Agriculture Organization (MAC/FAO) with regard to NSPFP activities, if the smallholder farmers are to be assisted to find the way out of food insecurity?

(1)

(2)

(3)

(4)

Thank You Very Much for Your Cooperation

APPENDIX IV

ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN MOROGORO REGION: A CASE STUDY OF NATIONAL SPECIAL PROGRAMME ON FOOD PRODUCTION (NSPFP) IN MANG'ULA DIVISION, KILOMBERO DISTRICT

1. SEMI-STRUCTURED INTERVIEW SCHEDULES FOR EXTENSION STAFF WORKING IN MANG'ULA DIVISION

(a) Date of Interview.....
(b) Name of Respondent.....
(c) Working Station.....
(d) Number of Respondent.....
(e) Name of Interviewer.....

2. INTRODUCTION

The purpose of the study is to examine the extent to which NSPFP participatory approaches have contributed towards increased rice production through the dissemination of selected improved rice technologies and practices in Mang'ula Division. You being among the extension staff working with smallholder farmers in the Division, I would like you to provide us with information about the selected improved rice technologies and practices and the extension approaches you use in your extension work. The findings of the study will help the government and other rural development agencies to improve their extension approaches. I kindly request for your cooperation with regard to this exercise. The information taken from you will be strictly confidential.

3. SOCIAL DEMOGRAPHIC INFORMATION OF EXTENSION STAFF

(a) Who is your employer?
(b) What is your gender?
(c) What is your age?
(d) What in your marital status?
(e) What is your highest level of education?
(f) What level of agriculture or livestock training did you attain?
(g) How long have you been working with your employer you mentioned in (3a)?
(h) How long have you been working as an extension agent in this village/division?
(i) Have you ever attended any retraining course?

(j) What is the course?

(k) Have the course improved your technical knowhow and communication skills?

4. SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT RICE SMALLHOLDER FARMERS HAVE ADOPTED IN MANG'ULA.

(a) How is the adoption of improved rice technologies and practices in your village/division?

(b) Which technologies and practices are more adopted by the smallholder rice farmers?

(1)
(2)
(3)
(4)
(5)
(6)

(c) Which ones are not adopted by the smallholder rice farmers?

(1)
(2)
(3)
(4)
(5)

(d) What are the reasons for rice smallholder farmers adopting and not adopting the technologies and practices?

(i) Adopting:

(1)
(2)
(3)

(ii) Not adopting:

(1)
(2)
(3)

(e) What is your observation in adoption rate of improved rice technologies and practices among PFG and non-PFG members?

(i) PFG members:

(ii) Non-PFG members:

5. EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG RICE SMALLHOLDER FARMERS DUE TO NSPFP PARTICIPATORY APPROACHES

(a) How is your work schedule in visiting smallholder farmers in your village/division?

(b) How frequent do you visit smallholder farmers in groups and those not in group?

(i) PFG members

(ii) Non-PFG members

(c) What approaches do you use in enabling them adopt the improved rice technologies and practices?

(1)

(2)

(3)

(d) Among the above approaches you mentioned in (5c) which ones do you use more frequently and why?

(i) Approach:

(1)

(2)

(3)

(ii) Reason:

(1)

(2)

(3)

(e) Has the selected trained demonstration farmer contributed any input to your working effectiveness and how?

(f) From your experience in this village or division, how do you score the degree of farmers adopting improved rice technologies and practices?

(g) Is there any improvement in rice yield per acre among smallholder rice farmers in groups and those not in groups?

(h) What is the average yield per acre among smallholder rice farmers in groups and those not in groups?

(i) PFG members

(ii) Non-PFG members

(i) What are the factors that have accelerated the transfer and adoption of improved rice technologies and practices among smallholder rice farmers in groups and those not in groups?

(1)

(2)

(3)

(4)

(j) What factors have impaired the transfer and adoption of improved rice technologies and practices among them?

(1)

(2)

(3)

6.0 ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS RICE PRODUCTION CONSTRAINTS OF SMALLHOLDER FARMERS IN MANG'ULA

(a) How frequent do you work together with smallholder farmers, research staff, input supliers and policy makers to address rice production constraints?

(i) Smallholder farmers

(ii) Research staff

(iii) Input Suppliers

(iv) Policy Makers

(b) Where do you normally meet together?

(1)

(2)

(3)

(4)

(c) Are the approaches advocated by NSPFP (demonstration farms, field days, workshops/ seminars, PFG meetings, trained demonstration farmers) useful in effecting your working together to address smallholder rice farmers production constraint?

(d) How would you rate the usefulness of working together with other key actors in problem solving and imparting knowledge in rice production to smallholder farmers?

(e) Has the programme increased smallholder rice farmers awareness of using the improved rice technologies and practices than what they knew before?

(f) From your opinion, what are the best attributes of NSPFP that have accelerated the transfer and adoption of selected improved rice technologies and practices among smallholder rice farmers?

(1)

(2)

(3)

(g) Do you think the smallholder rice farmers will continue to use the selected improved rice technologies and practices after the programme ends?

(h) Mention the areas that in future the Ministry of Agriculture and Food and Agriculture Organization (MAC/FAO) should do to improve the transfer and adoption of improved rice technologies and practices to smallholder rice farmers?

(1)

(2)

(3)

(4)

Thank You Very Much for Your Cooperation

APPENDIX V

MAIN CROP PRODUCTION TARGETS OF KILOMBERO DISTRICT FOR 1997/98

DIVISION	Paddy		Maize		Plantains		Root crops		Cotton		Sugarcane		Pulses	
	Ha	Tons	Ha	Tons	Ha	Tons	Ha	Tons	Ha	Tons	Ha	Tons	Ha	Tons
Kidatu	7441	22323	2704	9464	129	1613	496	4960	-	-	1000	84000	118	14
Mang'ula	5014	15042	2493	8776	336	4201	973	9730	-	-	-	-	40	39
Ifakara	6769	20302	3549	12422	175	2188	872	8720	-	-	13	1079	-	-
Mng'eta	2793	8379	2372	8302	1006	12575	643	6430	1150	892	40	3320	135	101
Mlimba	2767	8301	2703	9461	-	-	1002	10020	1255	1004	13	1079	-	-
Total	24784	74347	1382	48425	1646	20575	3986	39860	2405	1896	1066	89178	193	154

Source:DALDO'S office Kilombero

APPENDIX VI

MAIN FOOD CROP PRODUCTION IN MOROGORO REGION FOR FIVE YEARS

Year/Crop	Morogoro Rural		Kilosa		Kilombero		Ulanga		Total	
	Area (Ha)	Yield (Tons)	Area (Ha)	Yield (Tons)	Area (Ha)	Yield (Tons)	Area (Ha)	Yield (Tons)	Area (Ha)	Yield (Tons)
Rice										
1990/91	15909	31820	5653	11362	14742	29480	8696	17395	45000	190057
1991/92	21335	40471	9863	15686	18717	33690	11652	20973	61567	110820
1992/93	20807	62018	11007	7100	20269	32430	17998	7725	70081	109273
1993/94	18513	27772	12978	19463	20588	30880	13123	19685	65200	97800
1994/95	31568	52685	18914	31178	19703	40870	22317	32518	92500	157251
Total	108130	214768	58413	84789	94019	167350	73786	65778	334348	565201
Average yield/ha	2.0		1.5		1.8		0.9		1.7	
Maize										
1990/91	51560	113432	41723	91790	12245	26939	12114	26650	117642	258811
1991/92	43712	96168	44393	97673	10864	23900	11514	25330	110487	243069
1992/93	43078	94771	45118	99259	11175	24585	17631	38788	117002	257403
1993/94	42568	93651	62267	136987	12897	28373	13620	29964	131353	288975
1994/95	55986	95178	59492	90982	9776	18575	14910	33548	140164	238281
Total	236905	493196	252997	516691	56957	122372	69789	154280	616648	1286539
Average yield/Ha	2.1		2.0		2.1		2.2		2.1	

Source: RALDO'S Office Morogoro