THE ROLE OF PARTICIPATORY APPROACH (PA) IN SMALLHOLDER FARMER RICE PRODUCTION IN LINDI REGION: THE CASE OF KINYOPE MICRO-IRRIGATION PROJECT IN RUTAMBA WARD, MILOLA DIVISION IN LINDI DISTRICT.

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN RURAL DEVELOPMENT OF SOKOINE UNIVERSITY OF AGRICULTURE MOROGORO, TANZANIA

2003

ABSTRACT

Participatory approach in development is currently globally advocated by the majority of development agencies and governments, Tanzania being one of them. Unfortunately, little is known about the role of the approach in development projects. This study was conducted in Kinyope Village to determine the role of participatory approach in Kinyope Micro-Irrigation Project in Lindi District. The overall objective of the study was to examine the extent to which the involvement of the farmers in the planning process, and technology dissemination contributed to increased rice production in the study area. The Kinyope Village, from which a study sample of 132 MAPATA and Non-MAPATA respondents was randomly sampled, was selected by judgmental sampling technique out of 7 villages involved in the project. Seven extension staff and 8 government officials from Lindi and Mtwara regions were also included in the sample. Data were collected through interview using the pre-tested questionnaires and group discussions with the respondents. The collected data were statistically analysed using SPSS computer programme to obtain frequencies, percentages, Chi-square and ANOVA tests. The result of study reveal that participation was influenced by demographic and socio-economic factors, such as gender imbalances, dependence on family labour, farm sizes, courses attended by respondents in the study area, etc. Statistically significant ($*P \leq 0.05$) differences between MAPATA and Non-MAPATA respondents were observed regarding the distribution of respondents according to socio-economic variables, adopted technologies, reasons for adoption, rating of adoption, rice yields levels, and the frequency of visits by VEOs and GDFs; both were in favour of MAPATA respondents. Only proper seedbed preparation, and bunds

technologies were adopted. As a result of the adoption it was observed that rice yields had increased from 7 to 22 bags per acre. All government and party officials highly valued working with farmers to address production constraints. It was concluded that: socio-economic and demographic factors affected participation of target groups in the project. Thus research on the potentials, opportunities, and constraints of the target groups for sustainable extension programmes is important. The participation of farmers in the development of technologies, and their delivery in package form enhanced the dissemination and adoption. Therefore it is recommended that the formation and consolidation of Participatory Farmers' Groups (PFGs) should be promoted since it has been observed that they facilitate technology dissemination, adoption, and networking amongst the key actors in agricultural development.

DECLARATION

I, Francis Joseph Chuma Danda, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work, which has never been submitted for a higher degree award in any other University.

Signature..... Date..9-7-2003.....

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ACKNOWLEDGEMENT

I wish to express my heart-felt gratitude to all people who in one way or another contributed to the successful completion of this work and my studies at the Sokoine University of Agriculture (SUA). I would like also to give my sincere thanks to my supervisor Dr. B. J. Kasimila of the Development Studies Institute (DSI) for his guidance and tireless supervision during the preparation of the Research Proposal, implementation of the research and the write-up of this dissertation. His constructive criticism, guidance and suggestions together with his moral support throughout my entire study at SUA is appreciated.

I sincerely acknowledge and appreciate the Regional Administrative Secretary's Office Lindi Region and specifically to Mr. Musa Mdidi, the Regional Administrative Secretary for the financial assistance and other facilitation, which he provided me with. I also wish to express my sincere thanks to the RAS' office, Lindi Region, for granting me a study leave to undertake my MA (Rural Development) Degree Course.

Special thanks to the Rural Integrated Project Support (RIPS) of Lindi and Mtwara Regions for the financial support, and co-operation offered to me throughout my study. My extra sincere gratitude to Julie Adkins, the Program Manager for RIPS, for a close follow-up and interest in my studies. In fact her material and moral support during my two years' course are highly valued and will continue to make me feel highly indebted throughout the rest of my life.

I thank all members of the Development Studies Institute (DSI) of Sokoine University of Agriculture and MA (Rural Development) students 2000/2002 intake who, in one way or another, assisted me in due course, particularly in moral terms.

I am greatly indebted to my wife Flora Fraizer Msafiri for allowing me to go for further studies and the tolerance, encouragement and love she showed during my home presence and absence.

I am bowing with a thankful prayer to the Almighty God, Jesus Christ our Saviour and the Holy Spirit through whom I survived and remained vigorous in whatever I was doing.

DEDICATION

This Dissertation is dedicated to my beloved parents: My father Joseph Danda and my mother the late Filomena Sakibumo. "May almighty God rest your soul in eternal Peace! Amen".

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ABBREVIATIONS AND SYMBOLS

AERDD	-	Agricultural Extension and Rural Development Department
ARI	-	Agricultural Research Institute
ATIP	-	Agricultural Technology Improvement Project
AU	-	African Unity
DALDOs	-	District Agricultural and Livestock Development Officers
DIVEOs	-	Divisional Extension Officers
FOs	-	Farmers' Organisations
		from the same weir or inlet
GDFs	-	Group Demonstration Farmers
IFAD	-	International Fund for Agricultural Development
LDCs	-	Least Developed Countries
LEISA	-	Low-External Input and Sustainable Agriculture
		levels of significance)
LGRP	-	Local Government Reforms Programme
MAPATA	-	Farmers' Organisations constituting farmers using water
MATI	-	Ministry Agriculture Training Institute
MVIWATA	-	*Mtandao wa Vikundi vya Wakulima Tanzania* (Network of
		Farmers' Groups in Tanzania)
n	-	Sample size
N	-	Sub-sample or stratum size
NAEP II	-	National Agricultural Extension Programme II
NARLEP	-	National Agricultural Rehabilitation and Livestock Extension
		Programme
NGOs	-	Non- Governmental Organisations
Nr.	-	Number of respondents
ODA	-	Overseas Development Agency (British)
PATA	-	*Singular* form whereby MAPATA is its *plural form*
PFGs	-	Participatory Farmers Groups
		Programme Planning (OOPP)
RAS	-	Regional Administrative Secretary

RIDEP	-	Rural Integrated Development Programme
RIPS	-	Rural Integrated Project Support Programme
SACCOS	-	Savings and Credit Co-operative Society
SADCC	-	Southern African Development Co-ordination Conference
SPSS	-	Statistical PackageStatistical Package for Social Sciences
SUA	-	Sokoine University of Agriculture
Tshs	-	Tanzanian shillings
URT	-	United Republic of Tanzania
VEOs	-	Village Extension Officers
WEOs	-	Ward Executive Officers
ZOPP	-	*Ziel Orientiert Projek Planung,* e.g. Objectives Oriented
($P \leq 0.05$)	-	Statistical significance
($P > 0.05$)	-	Statistical insignificance (whereby "p" stands for observed
**	-	Observed statistical significance of the pair of compared items

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

The agricultural sector in LDCs is the mainstay and a leading sector of the economy. The farm sector therefore, has a key role to play in the economic development. Southworth (1967) has summarised those roles as follows: (I) meeting the additional demand of food resulting from population increase and remedy nutritional deficiencies, (II) contributing significantly to GDP and export earnings, (III) supplying raw materials required by industries, (IV) providing employment for idle labour and reserve it for industries, and (V) providing important market for industrial products.

In Tanzania, like any other third world country, agriculture is the backbone of the economy. Currently it accounts for about 50% of the national income and slightly more than 50% of mechandise exports, and is a source of livelihood for about 80% (World Bank, 2001). Agriculture in Tanzania relies mostly on smallholder farmers to produce more than 90% of the food supplies.

Generally, smallholder farmers hardly use improved agricultural technologies and practices in agricultural production. However, historical evidence proves that smallholders in Tanzania have been remarkably open to innovations, particularly to new crop varieties and new means of production, when it is demonstrated that these are to their advantage (Ruthernberg, 1968). Smallholder farmers usually have limited contacts with extension services, research centres, policy makers and the private sector, the important partners in agriculture.

Many criticisms have been made on the extension service by extension professionals, especially for its inadequate contacts with the majority of smallholder farmers (Mattee and Mollel, 1990). The criticisms are based on the assumption that many new and relevant agricultural techniques are available, and extension has failed to spread them among the farmers (De Vries, 1976). Smallholder farmers need information, new technologies, and practices developed by researchers to improve their agricultural production. Very simple and highly attractive innovations usually spread easily through the initiatives of the smallholder farmers themselves.

Recently, however, it has been observed that agricultural development in Tanzania is rapidly changing, and the change is easily noted, among others, in: (1) the formulation of new policies and creation of new organisations for agricultural development, and (2) the inculcation of more positive attitudes towards the value and applicability of research findings in smallholder farmers' environment (Laizer, 1999). Nevertheless, constrained access to input and timely advice, to a large extent hold back progress in the intensification of agriculture (World Bank, 2001).

Some researchers like Chambers, Pacey, and Thrupp (1989) argue that the process of generating and transferring technologies should not be left to research and extension staff alone. Rather, all stakeholders in the system of technology development and transfer should be involved from the early stages of programme planning and evaluation. That is why today there is increased effort to seek greater involvement of smallholder farmers in all stages of agricultural development process through the use of participatory approach. 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, for example, social, economic, institutional and ecological.

It is in this context that since 1995, Kinyope Micro-Irrigation Project has been trying to use participatory approach to facilitate increased agricultural production, as one of the interventions to abridge the food shortage gap in the district. The project was started to complement the efforts of the formal extension services in place, which suffer from staff shortages.

1.2 The importance of rice in Tanzania

Rice is placed in the categories of preferred staples in Tanzania, which also include maize and wheat (URT, 1995). These are the most important cereal crops and dietary mainstay of the majority of Tanzanians. Cereal consumption in Tanzania is estimated at 2,897 thousand tonnes per annum. Maize constitutes 78% of this amount while rice and wheat contribute 16.6% and 3.2%, respectively (Food Strategy Unit, 1989).

Paddy is mainly produced by smallholder farmers in Tanzania. However, in the past large scale production was limited to National Agricultural and Food Corporation (NAFCO). Rice is cultivated almost throughout the country, the leading producers being Shinyanga, Mwanza, Morogoro, Mbeya and Tabora regions, which account for about 70% to 80% of the national rice production per annum (Lemweli, 1992), cited by Gabagambi (1998).

Rice is also an important food crop in the South Eastern parts of Tanzania, Lindi and Mtwara Regions in particular. It ranks fourth in order of importance after maize, cassava

and sorghum (Ministry of Agriculture, 1992), cited by Kafiriti *et al.* (2001). The demand of rice in Lindi region is increasing due to the dietary shift from maize and cassava. Rice is also grown for commercial purposes, whereby it ranks fourth, after cashewnut, simsim and cassava.

In Kinyope Village, rice ranks fifth after maize, sorghum, cassava and peas as a food crop. However, rice is the leading cash crop followed by simsim, onions, and tomatoes (Appendices IX & X). National statistics show that the average rice yields (paddy) in Tanzania is 1.74 tons/ha, which is equivalent to 22 bags/ha (FAO, 1994). However, in Kinyope despite the dual roles rice plays, yields at farmers' conditions are very low, resulting into low household food security and income. The average yield of rain-fed and irrigated rice is estimated to be less than 1 tonne/ha per annum (Kafiriti *et al.*, 2001), while the potential is 3 tonnes/ha per annum.

Kinyope Micro-Irrigation Project, therefore, is an intervention aiming at increasing rice production to increase the household food security and income of the smallholder farmers in Lindi District. The project objectives had to be achieved through the introduction of selected improved rice technical package developed together with the farmers entailing bunds construction, proper seedbed preparation, row rice planting and high yield variety technologies.

1.3 Kinyope Micro- Irrigation Project

Lindi District Council considers Kinyope Micro-Irrigation Project as having the potentials to improve the existing acute food shortage in the district and Lindi Region at large. The

emphasis was put on two vital staples, namely rice and maize, due to their high preference and demand locally.

The project is being implemented under the District Irrigation Promotion Strategy with the facilitation and support of Rural Integrated Project Support Programme (RIPS) and Lindi Rural District Council, to Kinyope Village farmers' own initiatives. The project basically was a result of the PRA meetings convened by RIPS staff in 1995 whereby the villagers defined their priorities and deliberated on the opportunities and areas of collaboration. The Kinyope Micro-Irrigation Project was initially started at Kinyope Village. In recent years it has expanded to include Milola, Mkwaya, Rutamba, Ruo, Mahiwa and Matapwa Villages. (Shani.S.M., personal communication, 2001)

Participatory approach so far has been the major means of communication amongst the groups of farmers on one hand and the facilitators on the other. The approach is in line with the Tanzania Vision 2025 which aims at achieving democratisation and popular participation by creation of an active and participatory civil society in the articulation of its needs and in taking pride to fulfil its societal responsibilities.

RIPS, on the other hand, has been supporting the farmers' initiatives in various ways. The Programme support ranged from financial, consultancy services, facilitation of the extension staff with transport, acquisition of improved seed varieties to the exchange of experience with other farmers elsewhere.

At the beginning the project's intention was to introduce the water harvesting technology along the Milola River valley for irrigation through bunds technology (*Majaruba*) and other rice husbandry. In addition, the project aimed at facilitating smallholder farmers increase rapidly rice production and farm productivity on a sustainable basis through the innovation of compatible and low cost materials within the existing agricultural system. All these efforts aimed at reducing the prevailing gap between food demand and food supply in the district (Rashidi *et al.*, 1995).

The mentioned objectives were to be achieved as follows: (i) doing on-farm research whereby farmers themselves would participate in the development of new ideas or network of practices, and through village level farmers' research, (ii) provision of participatory training to farmers to upgrade their knowledge on rice production using group meetings, (iii) facilitation of farmers to manage water on their farms, (iv) formation of water users associations, and strengthening the existing ones (Shani, S.M., personal communication, 2001).

Kinyope Micro-Irrigation Project also intended to show that people's involvement in planning, implementation, monitoring and evaluation of projects is important, and that, field demonstration on how the barriers to the adoption of the available improved agricultural technologies can be identified and agreed-upon by all concerned actors. Finally, the project wanted to show that a sound programme of reform, investment and capacity building can be jointly designed for the removal of the respective barriers.

KINYOPE VILLAGE MAP

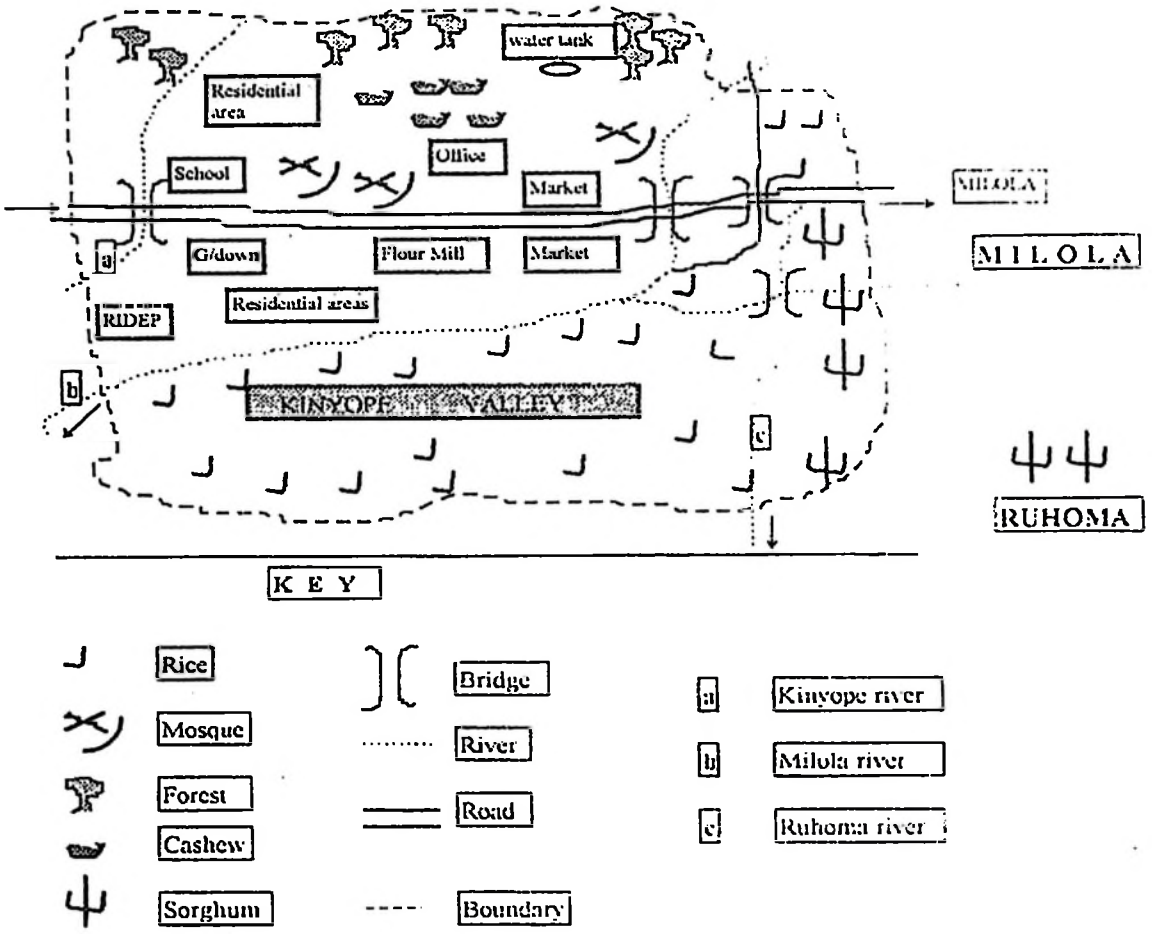


Figure 1. The map of Kinyope village.
It represents villagers view of their village.
the map was drawn by Kinyope villagers themselves,
Saidi A. Kombo
Saidi A.Machela
Juma M. Makwitila
Athumani Mkanyima, and
Ali A. Magimbi

Source: RIPS Lindi
Figure 1: Map of Kinyope Village

1.4 The MAPATA system

In Kinyope Villagers traditionally are paddy farmers. Rice production in Milola Valley has been using flood irrigation, which consists of water diversion structures (weirs or dams), built from local materials across the river and a rudimental network of canals. The weirs are locally called 'MAPATA' and are meant to raise the level of water to enable it flow into the canals. Water from the canals normally enter the rice fields and flow undirected according to the topography. Any surplus water returns into the river by natural channels (Rashidi, *et al.*, 1995).

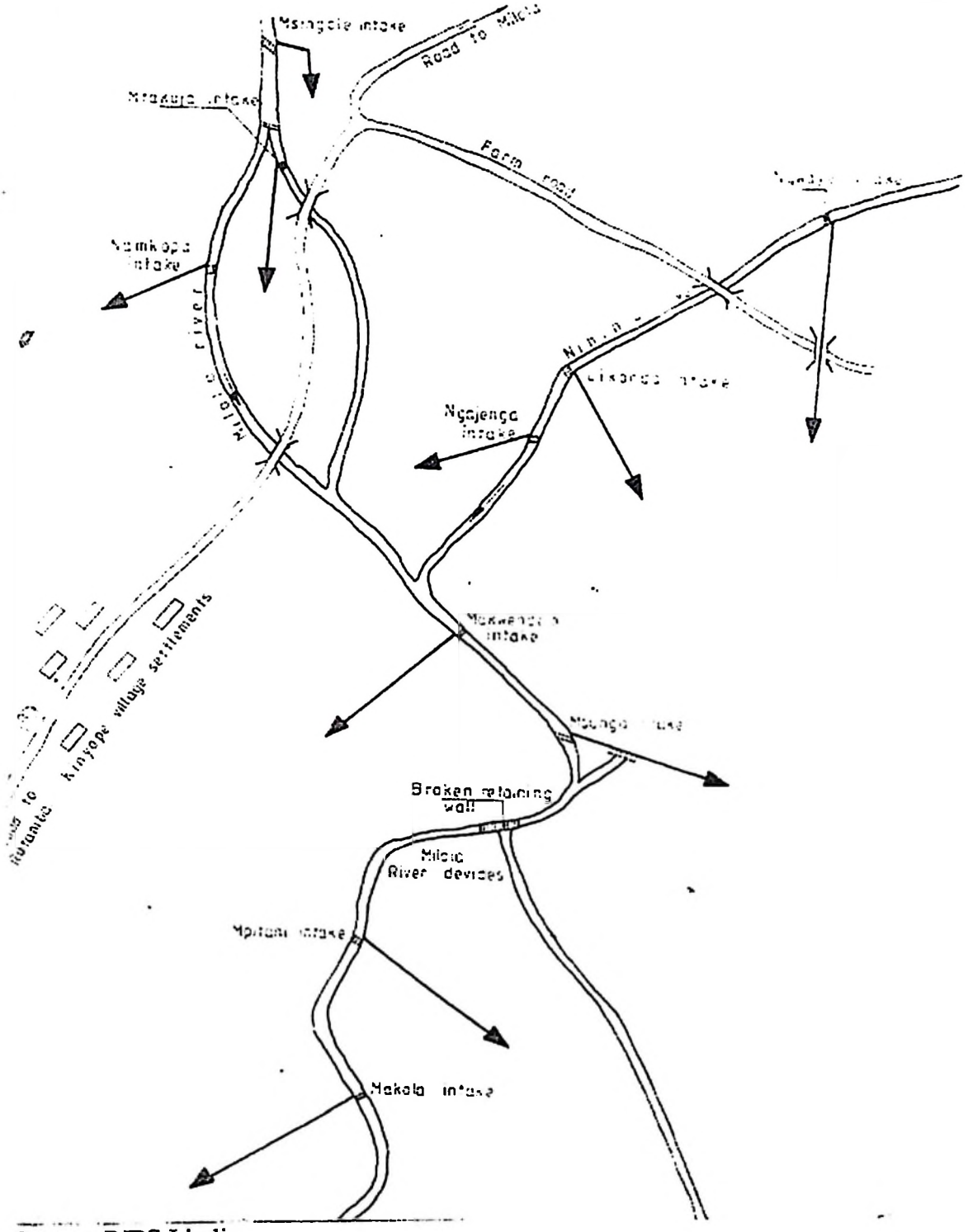
Generally, the diversions and water distribution system in the fields have been effective. However, it was found that the undirected water flow within the fields resulted into poor distribution. Consequently, the shallow water depth could not suppress weed's growth in high sports, a major advantage of irrigation lost, and the excessive water diversion by some of the farmers reduced the supply available to farmers further down the system. To solve the problems, all the farmers using water from the same diversions formed groups, which came to known as "MAPATA", acquiring their name from the name of diversions, to co-ordinate irrigation activities, and ensure proper, timely, and equitable distribution of water in the fields (Shani, 1998).

The Milola River Valley and that of Kinyope its tributary, have a total of thirteen (13) diversions or weirs and therefore forming 13 MAPATA groups respectively. Several workshops, seminars, and study tours were organised to create awareness and sensitise the stakeholders Kinyope farmers inclusive, on the importance of participatory decision-

making. Farmers were equipped with PRA tools to facilitate dialogues in the MAPATA, and participatory approach became the major means of communication within MAPATA and amongst the farmers on one hand and the facilitators on the other. Since then it has become a tradition, that all the decision making in the MAPATA is based on PRA approach and results of PRA meetings. The Participatory MAPATA meetings held by smallholder farmers in Kinyope have been a catalyst for them to adopt the selected improved rice technologies for increased rice production (Shani, S.M., personal communication, 2001).

The MAPATA have chairpersons, secretaries, treasurers and executive committees elected by the members. The 13 MAPATA form the PATA KUU (big weir), which is a village level network managed by a Central Committee whose members are the representatives of the 13 MAPATA. The organisational set-up of Kinyope Micro-Irrigation Project included a single PATA, PATA KUU, Village Government, District Council, and the Rural Integrated Project Support (RIPS) programme, the donor.

On the other hand, Non-MAPATA members are farmers cultivating rain-fed rice (upland rice). They are not members of any farmers' organisation, accessed by extension services and enjoy project spillovers, but do not practice participatory approach in problem solving.



Source: RIPS Lindi

Figure 2: Schematic presentation of the irrigated area (MAPATA)

1.5 Problem statement

Participatory Approach is currently being advocated strongly not only by Tanzania Government and Non-Governmental Organisations in Tanzania but also by International Organisations like AU, SADCC, World Bank, etc. because they argue that it speeds up development in the community. They further argue that this approach appeals for joint forces among stakeholders not only in decision-making process but also in actual implementation of the decisions. Hence, the stakeholders jointly influence, and share control over development activities, decisions and resources.

Kinyope Micro-Irrigation Project in Milola, Mingoyo and Matama Divisions in Lindi District has been practicing participatory approach since its establishment in 1995, with the aim of increasing quantity and quality of rice production in the area. The project facilitated the development and dissemination of the improved rice technical package and has managed to attract farmers from other villages also to replicate (Shani S. M. personal communication, 2001). Currently the following villages have started adopting and making use of the Kinyope Micro-Irrigation Project package: Milola, Rutamba, Mkwaya, Ruo, Mahiwa and Matapwa. It has been reported that among the successes of the project include: farmers under the project have dramatically improved their rice yields from 7 to 25 paddy bags per acre, strong water users associations (MAPATA) have been formed by the farmers, access to improved agricultural technologies has been increased, and constant discussions are being held with the stakeholder such as NGOs, policy makers, researchers, and extension staff. Unfortunately, the following are still unknown.

I. The effects of the socio-economic and demographic variables to the participation of smallholder farmers in the project.

II. The improved rice technologies and practices adopted by farmers as a result of Kinyope Micro-Irrigation Project.

III. The effect of the adoption on increased rice yields amongst the smallholder farmers due to Kinyope Micro-Irrigation Project.

IV. The attitude of key actors regarding contact to address the critical problems that constrain adoption of rice technologies and yields.

1.6 Justification of the study

Lindi District is among the 6 districts of Lindi Region. The other districts are Lindi Urban, Nachingwea, Kilwa, Liwale and Rwangwa. Since early 1995, emphasis on participatory approach in agricultural extension in Lindi and Mtwara Regions to compliment the formal extension services model in place has been on the increase (Shani, 1998).

Rutatora (1992) and Keregero (1989), cited by Laizer (1999) argue that, participatory approach is a result of malfunctioning of traditional extension approaches, which restrain the active involvement of smallholder farmers. However, there have been ambiguities in attempts to define and interpret people's participation among rural facilitators (Laizer, 1999). One general agreement has emerged by which participation now is conceived as the active involvement of the beneficiaries in all decisions related to objectives and activities,

as well as the activities themselves. The purpose is to encourage community self-determination to promote sustainable development (FAO, 1990).

Participatory approach, therefore, is an intervention based on the involvement of the beneficiaries in the planning process as a means of articulating genuine needs and satisfying them through self-reliance and mass mobilisation. The approach has arisen due to the acceptance of the fact that people can, to a larger extent, identify and modify their own solutions to their needs. Researchers and development workers in this case, can support the farmers to increase their capacity to manage change in their systems (Haverkort, 1991).

However, as far as Kinyope Micro-Irrigation Project in Lindi District, Lindi Region is concerned, the extent of active participation of key actors in the development, selection and dissemination of improved rice technology package is still unknown. The findings of the study will thus give a vivid and explicit picture of the effect of participatory approach with regard to rice production and will provide the base for recommending to other rural development interventions. The contribution of Kinyope Micro-Irrigation Project participatory approach in smallholder rice production in Rutamba Ward, Milola Division in Lindi District will be useful to policy makers, donor agencies, implementing teams, and others concerned with rural development to model and redirect their extension approaches to enhance active participation of the key actors, which is a prerequisite to agricultural development in Tanzania.

1.7 Objectives of the study

1.7.1 Overall objective

To examine the extent to which Participatory Approach (PA) has contributed towards increased rice production through the involvement of the smallholder farmers in the planning process, and dissemination of selected improved agricultural technologies amongst smallholder farmers in Kinyope Micro-Irrigation Project in Rutamba Ward, Milola Division in Lindi District.

1.7.2 Specific objectives

1. To determine the effects of demographic and socio-economic variables namely age, gender, marital status, education, farm size and labour on the participation of smallholder farmers in development projects/programmes.
2. To Identify improved rice technologies and practices that smallholder rice farmers have adopted in Rutamba Ward, Milola Division as a result of the use of Kinyope Micro-Irrigation Project participatory approach.
3. To examine the effect of the adoption on increased rice yields among smallholder rice farmers due to the participatory approach.
4. To examine the attitude of key actors regarding contacts to address smallholder farmers' rice production constraints.

1.8 Hypotheses

1.8.1 Hypothesis (I)

a) Null hypothesis (HO):

Demographic and socio-economic factors play a key role in the participation of smallholder farmers in development projects and programmes.

HO: $U1 = U2$

b) Alternative hypothesis (HI):

Demographic and socio-economic factors (i.e. age, gender, marital status, education, farm size and labour) do not play a significant role in the participation of smallholder farmers in development projects and programmes.

$U1 \neq U2$

1.8.2 Hypothesis (II)

(a) Null hypothesis (Ho)

The means of data for MAPATA and Non-MAPATA respondents are equal:

HO: $U1 = U2$

(b) Alternative hypothesis (Hi)

The Means of data for MAPATA and Non-MAPATA respondents' data are different.

Hi: The means are different.

$U1 \neq U2$

1.9 General assumptions

- The type of innovation appropriate for a particular farming system contributes to the increase in production and productivity.

- The adoption of innovation is a decision to make full use of the new ideas as the best course of action and it contributes positively to the increase in agricultural production.
- The understanding of constraints is a key for their removal, and hence it positively influences agricultural production trends.
- Demographic and socio-economic factors [age, gender, marital status, education level, farm labour and farm size], influence the participation of beneficiaries in development projects and thus, affecting agricultural production
- Under normal circumstances, adopters and non-adopters are different in the sense that the adopters are better off in terms of yields, life standards, increased adoption of improved technologies, etc.

1.10 Definition of key terms

The following terminologies have been used frequently in the text. They are defined here to provide a common basis of conveying the meaning.

1. **Adoption:** Is a decision to make full use of a new idea as the best course of action. Sometimes also is referred to as innovation decision process and it involves: (1) awareness (2) interest (3) evaluation (4) trial (5) adoption.
2. **Demographic factors**: Are the physiological aspects of human reproduction such as age, sex, and fertility. Included in this category are the number of living and dead children, marital status, birth interval, age dependency and family planning prevalence.

3. **Extension services** refer to the system of informal education, which assists farmers to improve farming methods and techniques through the application of scientific knowledge. This includes research, training, liaison and information dissemination with the purpose of increasing production efficiency and income to improve the farmer's standard of living.

4. **Innovation** is an idea, practice or object perceived as new by an individual. Usually, it is the newness to the individual that determines his reaction to it.

5. **Key actors:** The category includes government and political officials who by virtue of their positions influenced agriculture development in the study area. Specifically it refers to Member of Parliament (MP), District Commissioner (DC), District Agriculture and Livestock Development Officer (DALDO), District Extension Officer (DEO), Divisional Secretary (DS), Project Manager (PM), Village Extension Officer (VEO), Ward Councillor (WC) and Research staff (RS)

6. **Socio-economic factors**: These are the factors which relate to the social and financial aspects of life at the household level. They include income, education, occupation, place of residence and household assets.

7. **Technology** is the scientific study and use of applied science, e.g. engineering. Also sometimes it refers to the application of science to practical tasks in agriculture, industry, etc.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Agricultural innovations: Development, transfer, and utilisation

In the 1960s and 1970s 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. However, they did not fit the farmers' requirements and abilities. Often research efforts focused on sophisticated systems that required high level of external inputs like hybrid varieties, irrigation, agrochemical and machinery, not taking into account that most of the farmers and herders have restricted or no access to these inputs, and usually cannot afford buying them (Haverkort, 1991). Consequently, the developed technologies were incompatible with the socio-economic context of the farmers and hence not adopted.

In the 1980s and 1990s increasing efforts were made by development agencies to seek greater involvement of the target groups in all stages of development planning of projects and programmes. The aim was to create a state in which innovations would be derived from the beneficiaries whereby the field staff could serve as brokers to obtain additional assistance, confirming advantages and identifying application domain (Laizer, 1999). Ramirez (1997), as a result, calls for the rethinking of the role of extension agents and suggests that they should become information brokers, facilitators and capacity builders rather than technology transferers. The author further suggests that extensionists should be more problem solvers than conveyers of standard formulas from research stations. Studies

on irrigation development in Asia have found that unless farmers are involved from the very start, it will be very difficult to obtain their subsequent participation (Morris, 1991). According to Gamser (1988), farmers can identify constraints to certain project options, hence saving a project from implementing a system that will not be supported by local communities.

In order to facilitate the participation of the farmers in projects, it is recommended that the extension agents should see themselves as working with, rather than working for farmers and that potential clients are involved from the on set of programme planning. This is because doing things for people hardly achieves permanence, and mostly creates a sense of dependency and inadequacy. If the programme is solving problems for the people, the people themselves will seldom bother to work at solving their problems (Haverkort, 1991). It is also upheld that, during the facilitation process extension agents should listen more than talk, learn more than teach, and facilitate more than lead (Burkey, 1996).

Generally farmers are hard to convince by words, they need practical demonstrations, which will stimulate to tryout innovations themselves (Van Den Ban and Hawkins, 1996). Through demonstrations farmers can see the causes of problems and possible solutions. Demonstrations are thus powerful tools in agriculture extension service since they help to convince people more quickly through the triple process of observing, hearing, and learning by doing, and experiencing things for oneself (Kauzeni, 1989). Therefore, if the extension agents really want to get their messages across to farmers, they ought to be participatory oriented.

Farmers should be involved in the project planning process right from the beginning. Participation, helps them to learn to plan, find solutions to their problems, teach others, and organise the farmers to work together. Furthermore, through participation farmers develop inventiveness, creativity and the adoption of improved technologies for increased production is promoted.

Extension services assist farmers to improve their organisational and leadership skills so that they can effectively articulate their problems and needs (Swanson, 1984). However, 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 agents will gain farmers' confidence by offering them relevant reliable and usable technologies.

While it is important to recognise the contributions of smallholder farmers towards the success of agricultural programmes, it is even more significant to identify the factors, which inhibit their active participation. Laizer (1999) identified age, gender, marital status, education, farm size and labour as factors greatly affecting the participation of target groups in development projects and programmes.

2.2 Demographic and socio-economic factors affecting participation in Development projects

2.2.1 Age

It has been perceived that young people are less conservative than their elders, and hence are more likely to participate in agricultural programmes (Maunder 1973). Concerning this,

Nanai (1993) contends that, the level of participation tends to increase with the optimum age group after which participation starts to decline with increase in age. Further, the author found the age category between 25 to 34 years to be very active, creative and ready to tryout innovations. The age ranges above 34 years were found to be more preoccupied with home community based obligations.

However, Mwanyika (2001) argues that young people, particularly those in rural areas, are not very well decided about their future, and this usually affects their seriousness and commitment to participation in rural development programmes despite of their high potentials. Young people in the villages tend to adore urban life, and thus consider rural life as full of drudgeries and short of basic human necessities.

On the other hand, Minga (1998), cited by Mwanyika (2001), observed that the age range between 26 to 45 years to be the most active age group. The same was found by Liedholm (1998) in Botswana, Kenya, Malawi and Zimbabwe. It is therefore suggested that more attention should be given to the involvement of both groups.

2.2.2 Gender

A study conducted by Haverkort (1991) on participatory technology development in Eastern Indonesia showed that the majority of rural population mainly face special obstacles, which prevent them from participating in rural development programmes. Heavy labour demands, prevailing cultural restrictions such as not speaking at open meetings, inferiority of women's works and interests, patriarchal culture reinforced by the colonial

ideologies are some of the obstacles. Nanai (1993) found that men were consistently more active in development programmes than women.

Mngodo (1993), cited by Laizer (1999) observed a more or less similar situation in Sub-Sahara 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. Nanai (1993) contends that men generally have opportunities to participate in agricultural programmes than women due to their slightly less workload in the communities. This implies that active participation of women can be improved if opportunities are availed to them, and their workload is reduced through the use of appropriate technology and sharing responsibilities with men.

2.2.3 Education

Less educated people generally lack confidence in their efforts to improve their lives (Livinger and Drahman, 1980). Nanai (1993) found that the people's level of education has positive relationship with the level of participation. This is because education enables the farmers to analyse their situations, identify problems, and workout solutions.

So since education implies the provision of educational opportunities to those who do not have much of it, the extension agents have the role of improving smallholder farmers' education level. In order to increase farmers' confidence and win their participation in development projects, education of farmers is important. This is because the ability of

respondents to read and write is an advantage in that it facilitates the training of farmers in various agricultural development projects.

Kermer (1988), cited by Mwanyika (2001), observed high level of education to be a contributory factor in improving women's social and economic conditions. Thus, if the farmers' level of understanding is improved, participation will be enhanced (Laizer, 1999). The education of the farmers, therefore, by the extension programme is important for the enhancement of their confidence and win their participation.

2.2.4 Marital status

In spite of women being key contributors to agricultural production, they have been constantly marginalised by agricultural development programmes (Wiley, 1984). One of the factors mentioned as making women victims of poverty is lack of access to productive resources in the rural areas where the majority of them live (World Bank, 1993), cited by Mandara (1998).

The basic resource which rural women have poor access to is land. Married women are more likely to be affected most due to lack of ownership rights of land from husbands (Mjtter, 1994). Women usually have user rights to their husbands' lands, but plots offered to them are usually small as the larger part of the farm is for producing cash crops, which most often belong to men.

The same was observed by Overholt *et al.* (1984), that married women are rarely involved in the elaboration of policies or consulted when new farming technologies are introduced because they lack the necessary resources, namely land and credit. That is why whatever agricultural information exists in the village it is passed to the husbands and not to neither wives nor women who are busy working on fields, households' chores and other community obligations.

Sasakawa Global 2000 (1997) contends that the control and ownership of land have significant implications for women's income, long-term food security and social status because they facilitate access to credits, membership in co-operatives, and access to new farm technologies.

Shayo (1991) observed husbands and neighbours to be the women's main source of information rather than extension agents. On the other hand, the effectiveness of husbands as sources of information is questionable as it has been observed that the trickle-down of information from husbands to wives is impracticable (Van den Ban and Hawkins, 1996).

Limited participation in politics, development programmes, and public life has made wives remain the implementers of decisions made by husbands. The totality of the situation calls for the improvement of the status of women in rural development as a key factor, and the most effective way to promote agricultural production in the household and the nation at large.

2.2.5 Farm labour

Men and women have complementary labour roles within the household (Wirth, 1988). Boserup (1970), cited by Sasakawa Global 2000 (1997), describes women as farmers *par excellence.* In Tanzania it is estimated that on average women provide 60% of all farm labour force in agriculture (Koda, 1994). Women contribute in their capacity as farm owners, farm partners and farm labourers.

However, there is a division of labour in the production of crops, men being responsible for the arduous work like initial land clearing, and land preparation. Women are mainly responsible for planting, weeding, fertiliser application, harvesting and transportation (Sasakawa Global 2000, 1997). This obviously means that females contribute a large input in agricultural production in addition to the *typical* female work of meals preparation and care for children.

Laizer (1999) observed that, smallholder farmers in Morogoro, both Farmers Groups (FGs) and Non-Farmers Groups members, relied mainly on family members as their main source of labour in various field operations. It was also found that women spent on average 8.5 hrs/day and men 7.4 hrs/day in agricultural work during the farming season.

While Wagao (1991) notes adults and children of specific household to perform many farm operations, Wirth (1988) also points out that, in order to satisfy their needs over the year and to spread risks, men and women engage in a variety of occupations on a daily, weekly or seasonal basis. Similarly, Ashimogo (1995) observed the predominance of the reliance on family labour for farm work in most households in Tanzania.

2.2.6 Farm size

Gabagambi (1998) contends that, land fragmentation is very common in most parts of Tanzania whereby a smallholder farmer cultivates an average of two hectares located about 3 kilometres on average away from the household. This makes the cultivated land size of most households too small to meet the household needs. This coupled with the rudimentary tools used for agricultural operations further worsens the situation. Laizer (1999) also observed that a typical smallholder farmer in Mang'ula Division Kilombero District, cultivated rice on an average farm size of one hectare. Due to long distances, the majority of the smallholder farmers use bicycles or walk, and there are cases where farmers shift temporarily to stay in the field to avoid everyday travelling. The scatter of farmers has negative effects on adoption of improved agricultural technologies since they become less accessible by extension agents.

2.3 Adoption of agricultural innovations

Rural people obtain information from many sources. An innovation is an idea, practice or object perceived as new by an individual. Adoption or innovation decision process refers to a process through which an individual passes from first knowledge of an innovation to a decision to adopt or reject, to implementation of the new idea, and to confirmation of the decision (Supe, 1990). Five stages are conceptualised in the innovation adoption process, namely awareness, interest, evaluation, trial, and finally adoption.

By awareness an individual is exposed to an idea but lacks detailed information about it. For instance a farmer may know the name of a new crop variety, but may not know the

details. Awareness makes one develop interest that is he/she becomes motivated to find more information about the new idea. The individual will try to find out the details of the new crop variety. In the next stage the individual will conduct a kind of an evaluation in which he/she will consider the relative advantages of the new practice over the other alternatives available.

Normally, after having evaluated the technology the individual will apply it in a small scale in order to determine its utility in his/her own situation. In most cases the farmer will not adopt the new innovation without trying it out first in a small scale. The innovation adoption stage is the last one in the technology adoption process. At this stage the farmer uses the innovation continuously on a full scale. Having been satisfied with the trials of the new innovation, he/she will adopt it on a large scale.

Extension agents and other rural development facilitators would like to see that the adoption of recommended technical packages is accelerated. The potential uses of the innovation and the extension agents facilitate the diffusion process to the entire community. AERDD (1987) considers agricultural extension as a fundamental instrument responsible for the accelerated diffusion of innovations in the rural areas, and that any failure should be laid at the door of extension services.

However, the characteristics of innovations have been found to be an important factor in the adoption process (Rogers, 1995). Also there are many other circumstances, which render the adoption of innovations by the farmers impossible. Resources and personal values attached to the innovations by the individual farmer play a crucial role in the

decision to adopt or reject the innovation. The smallholder farmers' behaviour that is the earliness and lateness of adoption also influence the adoption trends. The farmers' behaviour also forms the basis of classification of farmers into adopter categories, namely innovators, early adopters, early majority, late majority and the laggards (Fliegel, 1984).

2.4 People's participation

People's participation is perceived as a joining of forces amongst stakeholders in the decision making process (Kajembe, 1994). Cohen and Uphoff (1977), cited by Burkey (1996), refer to people's participation as a process of involving people in decision-making, implementation, monitoring, evaluation and benefit sharing. The World Bank also sees participation as a process through which shareholders influence and share control over development activities, decisions and resources (Burkey, 1996). Generally, participation can be explained as an interactive process between the government, public services and the people.

There are two broad, but different interpretations of participation, which are: first participation as a *means* and second participation as an *end* (SADCC, 1987).

Participation becomes the means when it is used in order to achieve some predetermined objectives or goals. Participation for that matter becomes the way of using the economic and social resources of rural people to achieve the established objectives or goals. Governments and development agencies as service providers and controllers of resources mainly use participatory approach as a means to improve efficiency of their service delivery systems (Nanai, 1993). Participation thus becomes a managerial technique, which

intends to benefit both the provider and the consumer. In such a situation the local population is mobilised, directly involved in the tasks at hand, and the participation ceases once the task is completed. This form of participation is considered to be static, passive and controllable.

Participation in rural development is also viewed as an end in itself. It is a process in which confidence and solidarity amongst rural people are built up. In the context of rural development projects, participation as an end is an active form of participation, and its nature responds to the local needs and changing circumstances (SADCC, 1987). As a process it is viewed as a permanent feature of rural development and an intrinsic part which grows and strengthens as the project develops, and lasts the life of the project into a permanent dynamic involvement.

Thus participation as an end in itself should be a permanent feature of any project (Nanai, 1993). Participation as an end is also a managerial technique as well as a technique to facilitate rural people to have a more direct involvement in rural development, the critical elements being awareness-creation and organisation-building. Participation as an end involves a bottom-up planning process, by which the generation of influence or involvement starts from the grassroots level.

As for the benefit of participatory approach, Supe (1990) points out that, if the people participate in kind or labour contribution, they develop a sense of belonging towards the project, develop leadership in the village, and the confidence of the people increases. Moreover, involvement of beneficiaries ensures that the project design reflects the peoples'

real priorities, and the project itself reaches, and listens to the voice of the people. Peoples' participation further increases ownership, motivation, and ultimately sustainability. The project becomes accountable to the people, generates learning, and facilitates advocacy at all levels.

2.4.1 Participatory rural appraisal (PRA)

Participatory Rural Appraisal (PRA) is now being increasingly accepted as a philosophy and mode in rural development (Cernia, 1985), cited by Nagu (1999). It describes an increasing family of approaches and methods to enable people share and analyse their knowledge of life and conditions, plan and act. Participatory approaches have at their core the involvement of the beneficiaries in the designing and development of new technologies and practices, which have the potentials of improving their lives. They are collaborative methods of project design, which combine the skills, and knowledge of the beneficiaries who will use or are using the technologies with the technological and organisational expertise of those involved in its development.

In agricultural development participatory approaches are used to assist the smallholder farmers to analyse their present situation, assess their problems and potentials, identify their objectives, and define the steps necessary to achieve those objectives (IFAD, 2001). Participatory approaches comprise of Participatory Rural Appraisal (PRA), Community Action Plan (CAP), Participatory Monitoring and Evaluation and Participatory Beneficiary Assessment.

2.4.2 Agricultural Extension with participatory approach

Extension is an instrument of development and as such changes in our thinking on development will influence the practice. The previous formal extension model, which is based on technology transfer, has proved to be resistant to extension approaches other than itself. The shortcomings of extension based on technology transfer approach are now apparent. The model, which had its theoretical and conceptual origins in the developed Western countries, has proved irrelevant to the problems, which confront the vast majority of rural poor in the Third World countries who depend upon agriculture for a livelihood (AERDD, 1987).

The shortcomings in the technology transfer model have made extensionist start thinking about an alternative model. The consensus has been reached and participatory approach in agricultural extension has become the alternative to the formal extension model. That is why the call for greater participation of the farmers in decisions and processes that affect their lives is often heard today (AERDD, 1980).

The central elements in participatory approach are active participation and involvement of smallholder farmers in the three crucial stages namely; assessment, analysis and action (Temu and Due, 1996). Participatory approach promotes shared understanding and empowerment, which lead to joint decision-making. The approach usually starts with consultation and moves to negotiation of problems, solutions and approaches to end with decision-making and action (IFAD, 2001). The significance of the approach is that many poor rural people hardly are able to define and articulate their problems, hence the use of non-formal educational methods which depend on and encourage dialogue has proved to

be very effective in enabling them to participate in development projects and programmes. However, the role of facilitators, who are the extension agents in this case, is important since it helps the farmers deliberate information by joining with them in translating information and in selecting the best alternatives.

The fact that some technologies introduced are often inappropriate for resource poor farmers for economic, social-cultural, managerial and environmental reasons calls for the extension officers to consider the information in relation to the context of the groups and individual farmers' needs (Haverkort, 1996). Studies show that, although extension meetings are effective in the dissemination of agricultural innovations, rural women very rarely attend them because of the time constraints and customs (Wambura, 1992). Participatory approach is appropriate for that matter since it promotes dialogue in which the extension staff and farmers consider themselves as equals. The superiority of participatory extension approach is that, it provides opportunities for the farmers, extension and research, to learn together and build up technical packages appropriate to the farmers' needs. The greater input of the extension agent in the process is to help the farmers regain their confidence in themselves and their abilities to fight their way up from poverty (Burkey, 1996).

The success of developing feasible and usable technical bundles in developing countries will therefore depend on the degree to which stakeholders in agricultural development are involved in developing the respective packages. Haverkort (1996) argues that, because of the site-specific of the innovations needed, farmers should play a key role in technology development. The role of the researchers, extensionists and NGOs' field workers,

according to the author, should be to contribute to and improve loca
changing conditions through experimentation and adaptation of tec

In order to secure increased peoples' participation and involvement in various programmes, it is advised to apply many and different ways, including recognising and encouraging the farmers to express their problems, needs, aspirations and interests to be considered in the programme planning (Sofranko, 1984). Participation can also take the form of workshops, consultations, analyses or assessment using ZOPP techniques and participatory rural appraisal tools (IFAD, 2001). Sasakawa Global 2000 (1997) suggests that, to facilitate the participation of women, there should be concrete efforts by governments to increase the number of female extension agents, training of male extension agents to work with both males and female farmers, and use of contact farmers of both genders. It is also proposed that monitoring and evaluation should be done in participatory manner and should include indicators dis-aggregated on gender basis to address the impact of extension on both male and female farmers.

Moreover, in order to promote popular participation in agricultural development, decentralisation is needed. National and local authorities, as well as other partners including the beneficiaries themselves, have to be gradually introduced to new methods of working and new relationships of power. Participation and Savings and Credit Societies should go hand in hand to break dependence on high-cost money supplies, open up credit lines and teach farmers how to manage money for both the creation of income generating activities and saving for tomorrow (IFAD, 1999).

2.4.3 The networking of stakeholders in participatory approach

In recent years farmers' networking has been used as a tool for communication in extension. This is because the conventional assumptions of extension communication achieved little impact (Shenduli, 1998). In this section definitions and types of networking, the role and importance of networking, have been reviewed.

2..4.3.1 Types of networking

There are several definitions of networking depending on the perspective chosen. According to Alders *et al.* (1993) networking is any group of individuals and/or organisations who, on a voluntary basis, exchange information or goods or implement joint activities, and who organise for that purpose in such a way that individuals' autonomy remains intact. Farrington and Nelson (1994), cited by Shenduli (1998), have defined networking as the motor of the work of groups with a common goal or need. Networking exists solely to provide organisational structure in addition to providing information and inciting groups to act.

There are several types of networks according to different perspectives. For instance, Haverkort *et al.* (1991) classified networks according to the pattern of flow of information. In a hierarchical type of network, for example, information flow is controlled by the top, while in a horizontal network information flows directly among members. The authors also classified networks according to membership composition and activities involved. In this case networks can be formed by farmers organisations, researchers and extension workers, with a variety of activities, for example, information exchange, training, awareness

creation et cetera. Pluknett *et al.* (1993) give a classification based on operational styles. Others have classified networks basing on scope of geographical coverage and subject matter focus

The analysis of the different forms and types of networks reveals that they have certain advantages and disadvantages. Below (Table 1) is a list of networks together with their corresponding advantages and disadvantages to help people define the most appropriate network model for their situations.

Table1: Advantages and disadvantages of different Network Types

Type	Advantage	Disadvantage
Local level	Allows face to face contacts, eco-specific, informal	Limited scope and means
National level	Represents a large number of people, allows stronger policy voice, acquires more resources for large tasks	Require formalisation and core funding, limited interaction between members
Specialised	Well focused	Too narrow a focus
General focus on LEISA	Holistic	Too dispersed
Horizontal membership	Deeper contacts	
Vertical membership	Allows contacts between levels	
Centralised organisation	Executive power, easy for donors to deal with	Alienation from grassroots
Decentralised organisation	Democratic commitment	Difficult to maintain cohesion

Source: Alder et al. (1993)

2..4.3.2 The role of networking in extension

Networking is an activity in which people positively indulge, are encouraged to exchange ideas and experiences, are urged to take time to listen to each other and to work towards a new way of understanding old problems (Shenduli, 1998). This is important because,

farmers derive information from multiple sources, including other farmers, traders, input suppliers, outreach workers and formal research institutions (Ramirez, 1997).

The different actors comprise agricultural network communication and interact regularly in multiple ways to form new relationships for innovation. The relationship formed provides opportunity for reflection, for breaking down barriers and stimulating creativity. In agricultural development farmers networking plays the following roles in the adoption and diffusion of innovations:

(i) Risk sharing

A basic function of farmers networking is to build confidence among member farmers and to provide support and encouragement. New farmers can learn from older farmers and inexperienced farmers can learn from experienced ones and so avoid the repetition of mistakes.

(ii) Experimentation and demonstration

Experiments conducted by farmers' networks can effectively and efficiently serve to develop farming practices and enable farmers to investigate a proposed new practice more completely and more quickly. Also they take into consideration risks, labour requirements and community values, which are rarely taken into account by extension workers. Networks allow participating farmers to discuss and analyse each other's observation and experiences. This process results into valuable research questions. When forwarded to agricultural research organisations these questions and requests should be undoubtedly carrying more weight because they are put forward by a network rather than individual farmers (*Alders et al.,* 1993)

(iii) Empowerment

Farmers networking can focus around many areas of common interests and needs. As farmers join together and begin to support and learn from each other, a network develops strength. It becomes increasingly able to promote the common interests of its members and of the larger community. Practical outcomes can be co-operative purchasing of supplies, co-operative selling, and marketing of produce. Well established networks can be effective advocates of policy change, claim improved access to public services for or at least interest in the issues of environment and development, which affect farmer's lives (Alders *et al.*, 1993).

(iv) Extension and communication

Farmers networking can obtain and disseminate agricultural information from outside the network. Networks have often emerged in response to absence of an adequate extension service. Yet the existence of such networks can facilitate the work of extension workers and researchers provided that these accept the network for what it is (Shenduli, 1998).

It is evident from the continuing discussion that extension communication is a complex process which requires a well established system, a system that firmly links senders of extension message to research and to farmers through efficient communication channels, and a system which is active, reciprocative and efficient in conveying message to and from farmers.

However the conventional extension set-up has failed to deliver extension messages, due to inefficient and lack of links at some points in its totality. Today many extension communication experts think that networking can improve on the conventional extension

communication system. That is why many governments, NGOs and development programmes have ventured into promoting farmers local networks. It is in the same spirit, Kinyope Micro-Irrigation Project promotes MAPATA network the PATA KUU or Big weir.

2.5 Farmers' organisations

Farmers' organisations (FOs) are important vehicles capable of orienting agricultural research and policy towards the needs of rural poor living in complex and risk prone environment. There are many different types and sizes of FOs with a variety of roles. However, FOs, which have strong base with the rural poor, can help to build sustainable livelihoods for the rural poor in several ways. First, they can act as an interface between research and extension worlds of development agencies and the livelihood condition of the resource poor farmers population (Box, 1987). Second, they can actively adapt and disseminate agricultural technologies in programmes that they themselves control and administer (Bebbington, 1989). Third, they act as users' constituency for the rural poor, pressuring public sector and NGOs to orient their work to the needs of the poor (Roling, 1988).

The most common role of the FOs is to smoothen the relationship between the research and extension concerns of outside agencies and the indigenous knowledge and innovations of farmers. Where an FO already exists, it represents a point of entry in the region for external agencies. The farmers' organisations can direct the agency to expert farmers, use

their meetings for discussion of the agencies' agricultural matters, provide locally relevant knowledge, and facilitate extension activities through their networks (Ramirez, 1997).

Farmers' Organisations also increase the scope for open, critical conversation between the technicians and farmers for reflection on the nature of desirable agricultural technology. This better targets agricultural research and extension to farmers' needs and provides opportunities for combining formal and informal agricultural knowledge (Ashby, 1987), cited by Laizer (1999).

Mushi (1986) also observed that farmers' contacts with other stakeholders in agricultural development can be facilitated by organised farmers' associations, which form a base in promoting, interchange of action and reactions. Agricultural development is therefore inconceivable without farmers' associations.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Overview

This section describes the methodology used during the research work. It includes description of the research area, research design, sampling procedure, data collection and statistical procedures used to analyse the data.

3.2 Research design .

The research design used was a cross-sectional survey to facilitate the study of the cross-section of the population of Kinyope Micro-Irrigation Project area at a single point in time. This design was opted because it is the most common in survey research, and it makes possible the collection of data at a single point in time once in the selected areas. A cross-sectional design was opted also to get quantitative as well as qualitative information using a combination of structured, semi-structured, and unstructured interview schedules. According to Babbie (1990) and Bailey (1978), this method is suitable for a descriptive study as well as for determination of relationships between and among variables.

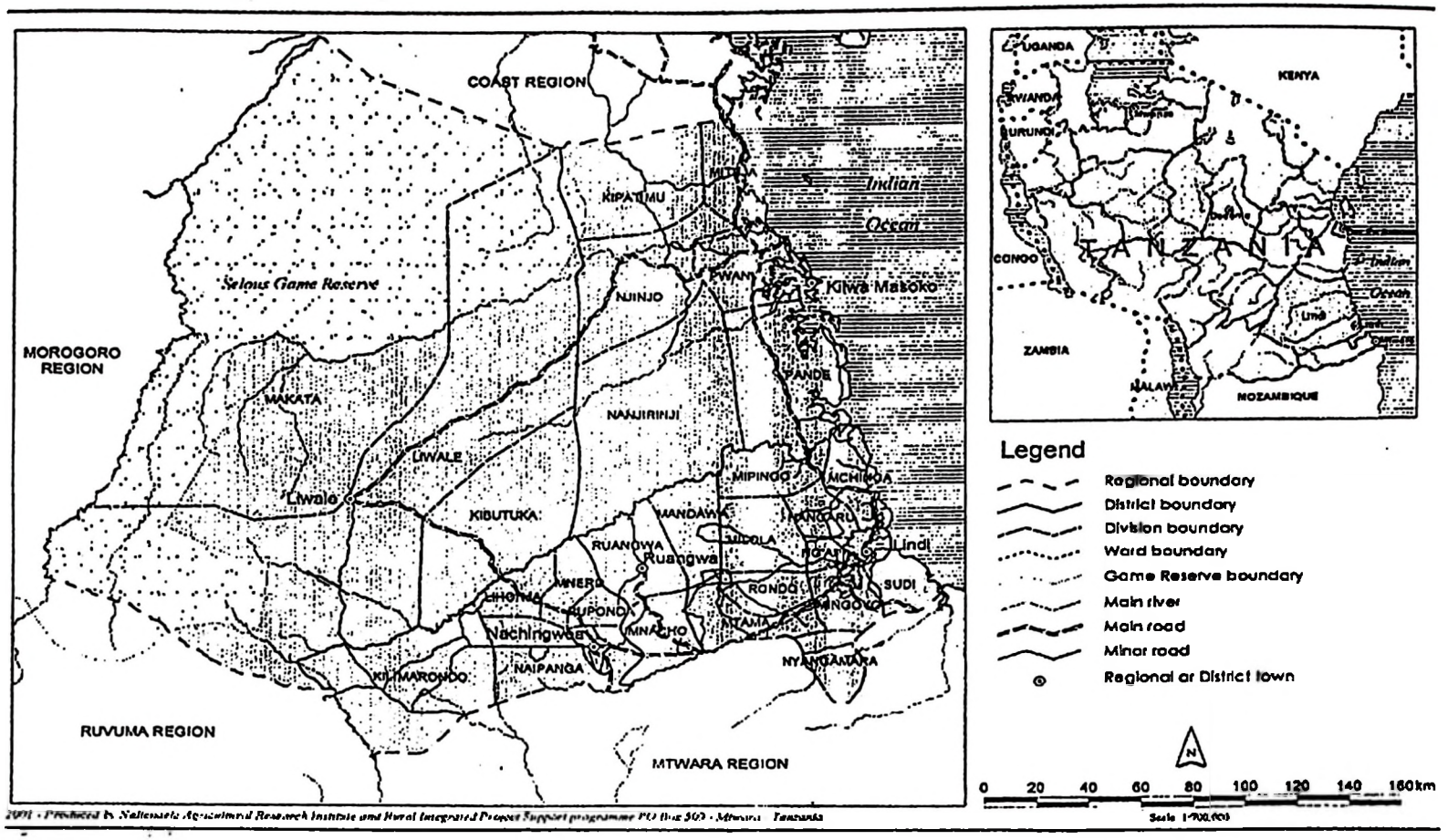
3.3. Location

The research work was confined to Kinyope Village in Rutamba Ward, Milola Division, in Lindi District. Lindi district is one of the districts in Lindi Region. The district has an area of 9,926 square Km. with a total population of 316,423. The total arable land is 9,434 square Km. whereas the area under cultivation is 1,062.5 square Km. Geographically Lindi District is located in the South of Equator between latitude 9° and 105° South and

longitude 38.5° and 40° East of Greenwich. The district has rainfall ranging between 800mm to 1000mm per annum with a monomodal type of rainfall, which starts from November to April. The minimum temperature is 24°C, while the maximum temperature is 27°C.

The other districts of Lindi Region are Kilwa, Liwale, Rwangwa and Nachingwea. Lindi District is in the South East of the region. It borders with Kilwa District in the North, Rwangwa and Nachingwea Districts in the West, Mtwara region in the South and the Indian Ocean in the East.

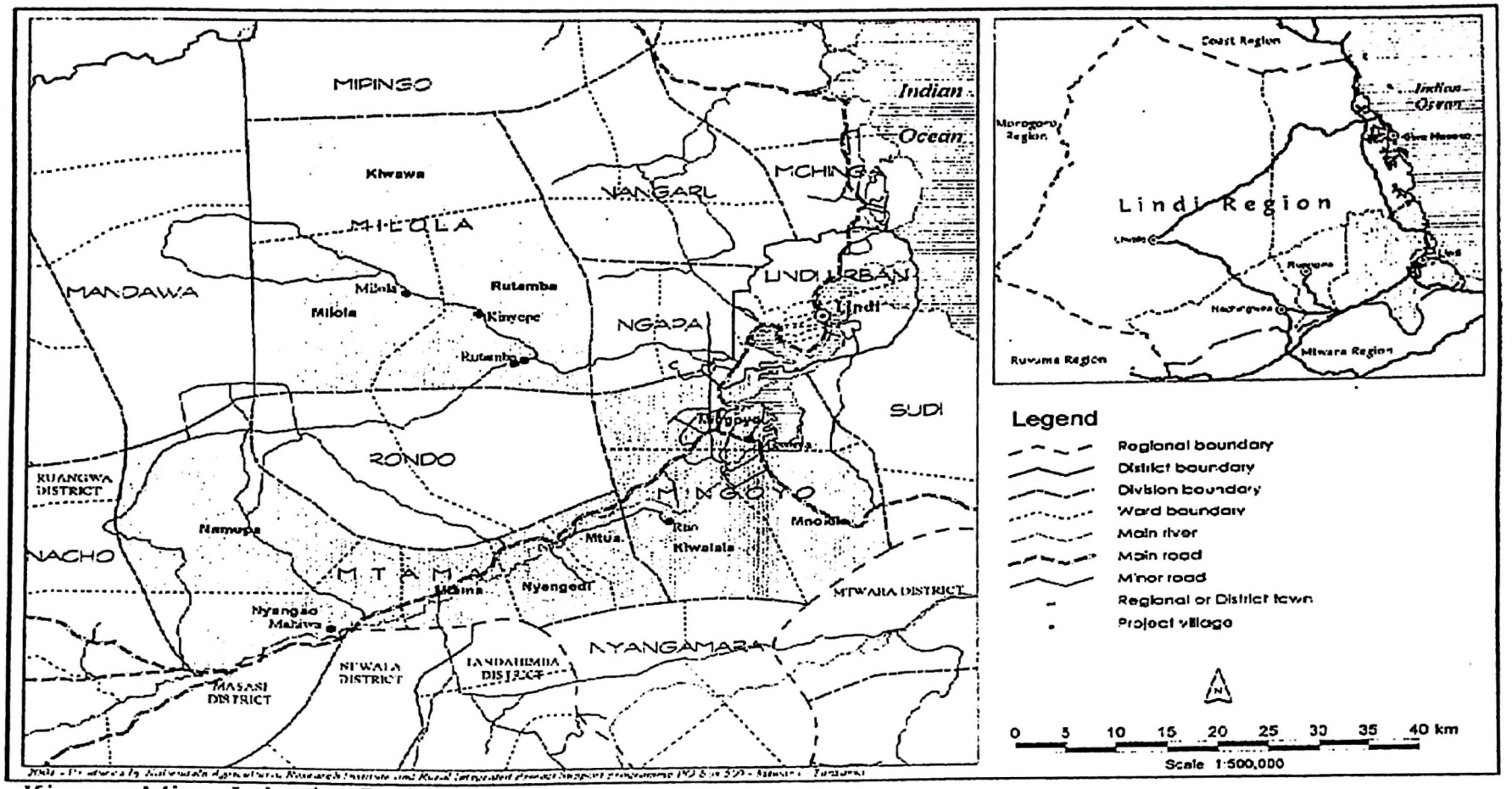
The project coverage includes Milola, Mingoyo and Mtama Divisions and the villages of Rutamba, Kinyope, Matapwa, and Milola itself for Milola Division, Ruo and Mkwaya Villages for Mingoyo Division and Mahiwa Village for Mtama Division in particular, with the estimated population of 6,200 people projected from 1988 census figures. The project in Kinyope Village is situated along Milola and Kinyope River plains, which have high potentials for rice production. Kinyope Village is about 52 Km from Lindi town and is accessible by an all-weather road from Lindi town to Milola. Farmers in Kinyope Village depend on water for irrigation from Milola River and Kinyope its tributary, which originate from the surrounding hills, whereas Mkwaya, Ruo, and Mahiwa village farmers depend on water from Lukuledi River. The choice of Kinyope Micro-Irrigation Project was based on the fact that it involves smallholder farmers to whom rice and maize are their staple food and main sources of income, and farmers apply participatory approach in development planning.



Lindi Region

Source: GIS Unit ARI- Naliendele- Mtwara

Figure 3: Map of Lindi Region



Kinyope Micro-Irrigation Project Area

Source:GIS Unit ARI-Naliendele- Mtwara

Figure 4: Kinyope Micro-Irrigation Project Area

3.4 Sampling procedures

3.4.1 Population

The population of Kinyope Micro-Irrigation Project consisted of all smallholder farmers in the following villages: Kinyope, Milola, Rutamba, Mkwaya, Ruo, Mahiwa and Matapwa, estimated to be 6200 people projected from the 1988 census data. However, the population of this study consists of sampled smallholder farmers in Kinyope Village.

3.4.2 The sampling technique

Due to difficulties in obtaining the sampling frame and the wide spread of the study population, the researcher opted for a purposive (judgmental) and random sampling methods. Purposive sampling technique enables the researcher to choose the location and respondents considered to be ideal for the research, possessing the desirable characteristics and the variables to be studied. Although the method does not ensure representativeness, however, it can provide useful information. Kinyope a village in Milola Division, was purposely selected out of the 7 villages involved in the project mainly because it involves smallholder farmers to whom rice and maize are their staple foods and main sources of income, also because farmers apply participatory approach in development planning.

All 13 MAPATA Farmers' Organisations in Kinyope were selected in this study. Through random sampling technique 66 MAPATA members and 66 Non-MAPATA members were selected and together formed a total of 132 (n=132) sampled respondents. The two strata were used in order to facilitate comparison between those who are in the project and those who are not. Additional information was also collected from 7 extension staff directly involved in the project, and 8 civil servants by virtue of their positions namely, the District

Administrative Secretary (DAS) for Lindi, District Planning Officer (DPLO), District Agricultural and Livestock Development Officer (DALDO), 2 staff working with DALDO's office, 2 Zonal Irrigation Officers, 2 ARI-Naliendele researchers, and the Regional Agricultural Economist for Lindi.

3.4.3 Sample unit

The sample unit comprised of:MAPATA sampled respondents	66
Non-MAPATA sampled respondents	66
Sub-total	**132**
For additional information the following also were interviewed:	
Regional Agricultural Economists	1
Extension workers in the project area	7
District Administrative Secretary	1
District Planning Office	1
District Agricultural and Livestock Development office	1
DALDO staff	2
Zonal Irrigation Officers	2
ARI-Naliendele Researchers	2
Sub-total	**15**
Grand total	**147**

3.4.4 Rationale

The fact that the project included 3 divisions, namely Milola, Mingoyo and Mtama and more than 7 widely scattered villages, made it difficult for the study to cover all the villages. Moreover, the time allocated for data collection was only 3 months, that coupled with the shortage of resources greatly minimised the study coverage. Thus, for the purpose of this study, only one village was considered, namely Kinyope Village in Rutamba Ward, Milola Division. From the 13 MAPATA with a total of 700 members, 66 respondents, which is approximately 10% of the total number of members, were randomly selected. Similarly, 66 Non-MAPATA respondents (approximately 100%) were randomly selected

to form the sub-sample out of 70, the total of Non-MAPATA members found in Kinyope Village.

3.5 Data collection instruments and analysis

3.5.1 Data collection

Two types of data were collected, namely primary and secondary data. The pre-tested closed and open questionnaires were used for face-to-face interviews. Although the questionnaires were designed in English, the interviews were conducted in Kiswahili. Closed questionnaires were used to interview MAPATA and Non-MAPATA respondents due to illiteracy problem, whereas open questionnaires were used to interview extension workers and the other respondents indicated under the sample unit sub-topic.

1. Primary data

Primary data were collected through interview using the pre-tested questionnaires and group discussions with the respondents.

2. Secondary data

Secondary data were obtained from RIPS' and RAS' reports in Lindi and Mtwara Regions, and from other relevant reports from Zonal Irrigation Unit in Mtwara, Agricultural Research Institute (ARI)-Naliendele, District Agricultural and Livestock Development Office in Lindi, etc. Also the secondary data were obtained from some minutes of the MAPATA meetings and through observation. Great care was paid in recording of the data.

3.5.2 Data analysis

The data collected were carefully coded by using computer sheets and analysed by using the Statistical Package for Social Science (SPSS) programme. The descriptive statistics such as frequencies, chi-squares and means were determined. Chi-square was in particular used to determine the strength of the evidences of the existence of statistical differences between the means for MAPATA and Non-MAPATA respondents' data. The Analysis of Variance [ANOVA] at 5% level of significance was also used to test for statistical significance among some variables for MAPATA and non-MAPATA respondents' data.

3.6 Limitations

1. Filling in the questionnaires was a problem due to illiteracy problem. Some respondents responded only to some of the questions, as for the others, simply said that they do not know anything.
2. Some of the respondents dodged, while the others, especially the Non-MAPATA ones, their scatter and long distance to their residences on the farms from the village limited access.
3. Time and resources were so limited for explicit study of the research topic in question. The researcher, therefore, decided to choose Kinyope Village in which the MAPATA and Non-MAPATA respondents were found but with greatly differing proportions.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Overview

This chapter presents the results of the study on the role of participatory approach in smallholder farmers' rice production. Kinyope Micro-Irrigation Project in Rutamba Ward, Milola Division in Lindi District, Lindi Region was taken as a study case.

The chapter is divided into four sections based on the already stated objectives: namely to determine whether demographic and socio-economic variables have or have no effects on participation of smallholder farmers in development projects and programmes; to justify as to whether the improved rice technologies and practices which smallholder farmers have adopted in the study area is the result of their use of Kinyope Micro-Irrigation participatory approach or not; to determine as to whether the increased rice yields among the smallholder rice farmers derive from the effect of participatory approach adopted in the study area, and to examine the attitude of party leaders, government leaders, and technocrats about working together to address the constraints facing the smallholder farmers' rice production.

4.2 The effects of demographic and socio-economic variables on the farmers' participation

One of the issues, which were not known about Kinyope Micro-Irrigation Project, was the effect of demographic and socio-economic variables on smallholder farmers' participation in development programmes and projects. In deliberating this issue a focus was made on

the attributes and degree of smallholder farmers' involvement in the selection, dissemination and utilisation of improved rice technologies and practices.

4.2.1 Demographic variables

4.2.1.1 The ages of respondents

Table 2: Distribution of respondents according to age (n=132).

Age range(Years)	MAPATA respondents (N=66)		Non- MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
18 - 25 years	2	3.0	6	9.1
26 - 33	18	27.3	15	22.7
34 - 41	18	27.3	13	19.7
42 - 50	9	13.6	10	15.2
Above 50	19	28.8	22	33.3
Total	66	100.0	66	100.0
Chi-square (SPSS)	3.351	df.4	Observed significance 0.501	
Anova (SPSS)	F = 0.017	df.1	Observed significance 0.896	

Table 2 presents age distribution of MAPATA and Non MAPATA members' sampled. About two-thirds 47 (68.2%) of MAPATA respondents were between 26 and 50 years of age. Only 2 of them (3.0 %) were between 18 to 25 years of age and 19 (28.8 %) were above 50 years old. Whereas only 38 (57.6) of sampled Non-MAPATA aged between 26 and 50 years old, 6 (9.1%) between 18 and 25 years old and 22 (33.3%) were above 50 years of age. MAPATA had more respondents than Non-MAPATA who were between 26 and 50 years of age and Non-MAPATA had more respondents than MAPATA who aged between 18 and 25 years and those above 50 years of age.

This is in line with the findings by Nanai (1993) that, the level of participation tends to increase with the optimum age group, after which participation starts to decline with

increase in age. The age between 26 to 50 years old proved to be the most active, creative and ready to tryout innovations.

For age category above 50 years, 19(28.8%) and 22(33.3%) were observed for MAPATA and Non MAPATA respondents, respectively. This is a bit peculiar. However, it reflects the old generation's awareness of the importance of improved rice technology application in agriculture for increased production.

As for the age group between 18 to 25 years, the findings are in line with the observation by Mwanyika (2001) who found that young people, particularly those in rural areas, were not very well decided about their future and this usually affected their seriousness and commitment to participation in rural development programmes despite their high potentials. The author further argues that young people in the villages tend to adore urban life and thus consider rural life as full of drudgeries and short of basic human necessities.

An insignificant difference (P>0.05) was noted between MAPATA and Non-MAPATA respondents concerning their distribution agewise.

4.2.1.2 Gender

Table 3: Distribution of respondents by sex (n=132)

Sex	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Male	37	56.1	43	65.2
Female	29	43.9	23	34.8
Total	**66**	**100.0**	**66**	**100.0**
Chi-square (SPSS)	**1.142**	**df. 1**	**Observed sign. 0.285**	
Anova (SPSS)	**F = 1.135**	**df. 1**	**Observed sign. 0.289**	

From the results in Table 3, we learn that about three-fifths 37(56.1%) of respondents from randomly sampled MAPATA were men, while for Non-MAPATA men were 43(65.2%). The proportion of sampled women who were interviewed was generally smaller 29(43.9%) and 23(34.8%) than that of men. Haverkort (1991) found that this was reflecting the traditional patriarchal system and cultural restrictions like not speaking at open meetings prevailing in most of the communities. This has, to a great extent, contributed to women's unwillingness to be spokespersons in matters pertaining to their life situation.

It was also observed that the gender distribution of extension staff in the study location was generally patriarchal, since the males' representation was 7(100%), while that of females was 0(0%) and hence supporting Haverkort's observation. To rescue the situation Sasakawa Global 2000 (1997) suggests that there should be concrete efforts by the governments to increase the number of female extension agents, training of male extension agents to work with both male and female farmers and the use of contact farmers of both genders.

It is important that Monitoring and Evaluation should be done in participatory manner and should include indicators dis-aggregated on gender basis to address the impact of extension on both male and female farmers. An insignificant statistical difference ($P>0.05$) was observed between MAPATA and Non-MAPATA respondents.

4.2.1.3 Marital status

Table 4 : Distribution of respondents by marital status (n=132)

Marital status	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Married	49	74.2	46	69.7
Single	4	6.1	3	4.5
Divorced	5	7.6	7	10.6
Widow	3	4.5	5	7.6
Separated	5	7.6	5	7.6
Total	**66**	**100.0**	**66**	**100.0**
Chi-square (SPSS)	**1.071**	**df. 4**	**Observed sign 0.899**	
Anova (SPSS)	**F = 0.366**	**df.1**	**Observed sign. 0.546**	

Results in Table 4 show that the majority 49(74.2%) and 46(69.7%) of respondents were married in both MAPATA and Non-MAPATA, respectively. The results also show that 4(6.1%) of MAPATA respondents were singles, whereas for Non-MAPATA singles were 3(4.5%). Moreover, 5(7.6%) and 7(10.6%) of respondents from MAPATA and Non-MAPATA respectively were divorced. In addition, 3(4.5%) of MAPATA as well as 5(7.6%) of Non-MAPATA respondents were widowed. Lastly, 5(7.6%) of MAPATA and 5(7.6) Non-MAPATA respondents were separated.

From the study findings it seems that, marriage promotes participation of the couples in development projects due to complementarity of men and women labour roles within the household as observed by Wirth (1988). The idea is further supported by Koda (1994) who observed that by estimation women provided on average 60% of all farm labour force in agriculture in Tanzania.

However, poor access to productive resources namely land and capital seems mostly to affect married women. Normally married women have use rights to their husbands' lands.

However, the plots offered to them are usually small as the larger parts of the plots are set aside for producing exchange crops, which most often belong to men (Mitter, 1994).

Moreover, Overholt *et al.* (1984) also observed that married women are rarely involved in the elaboration of policies or consulted when new farming technologies are introduced even though they are of direct concern to them. The author further argues that, whatever agricultural information exists in the village is usually passed to the husbands and not either to wives or women who are busy working in fields, households' chores and other community obligations. The challenge to the community therefore is to develop positive attitude towards women as equal partners in agricultural and rural development at large.

Through discussion with the few female singles, the divorced and the separated MAPATA and Non-MAPATA respondents, it was observed that these respondents considered marriage as useless because husbands were mere exploiters. They said husbands usually participated less in farming activities but at harvest they were at the fore front selling rice without consultations and misusing the money they got. The findings reveal little difference ($P>0.05$) between MAPATA and Non-MAPATA respondents.

4.2.1.4 Level of education

Table 5: Distribution of respondents according to education level (n=132)

Level of education	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Adult education	1	1.5	3	4.5
Primary education	47	71.2	47	71.2
Secondary education	1	1.5	0	0.0
Islamic religious education	16	24.3	16	24.3
Others	1	1.5	0	0.0
Total	**66**	**100.0%**	**66**	**100.0%**
Chi-square (SPSS) 3.000	**df. 4**	**Observed significance 0.558**		
Anova(SPSS) 0.203	**df.1**	**Observed significance 0.532**		

From Table 5 it can be observed that the majority 47(71.2%) of MAPATA and Non-MAPATA respondents had obtained primary school education, whereas, 16(24.3%) of both had obtained Islamic-religious education. One 1(1.5%) and 3(4.5%) of MAPATA and Non-MAPATA respondents, respectively, had acquired adult education. Only 1(1.5%) of MAPATA respondents and none of the Non-MAPATA had attained secondary education. This generally implies that the level of literacy in the study area was almost three-quarters 48(73.0%).

This shows that the potentials and opportunities available for the extension staff attempting to help the farmers to improve farming methods and techniques, to increase production efficiency, and to improve the farmers' standard of living are high. This is in line with Nanai (1993) findings, that the people's level of education has positive relationship with the level of participation since the educated farmers normally have confidence in their

efforts to improve their lives. Education also enables the farmers to analyse their situations, identify problems and workout solutions.

Generally there were insignificant differences (P>0.05) between MAPATA and Non-MAPATA respondents regarding the levels of education attained.

4.2.2 Socio-economic variables

The important variables considered in this section were mainly; food crops grown, farm size, the major sources of farm labour, and the type of courses attended.

4.2.2.1 Main Food crops grown

Table 6(I): The main food crops grown by respondents in frequencies (n=132)

Farm characteristic	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
Main food crops	Nr.	%	Nr.	%
Rice	66	100.0	66	100.0
Maize	21	31.8	35	53.0
Others	9	13.6	16	24.3
Chi-square (SPSS)	13.766 df. 4	Observed signif. 0.008*		

Note: Respondents indicated more than one option

Table 6(I) results show that generally the main food crop was rice, followed by maize. For MAPATA members 66(100.0%) of respondents confirmed that rice was their major food crop. About one-third 21(31.8%) of respondents established that maize ranked second, while 9(13.6%) revealed dependence on other types of food crops also, mainly sorghum and cassava.

Similarly, 66(100.0%) of Non MAPATA respondents said that rice was their major food crop, 35(53.0%) revealed that maize ranked second and 16(24.3%) confirmed dependence on other types of food crops also. From the results it can be observed that due to high risks (rain-fed agriculture), the Non-MAPATA respondents were more diversified (to wide spread risks) than the MAPATA respondents. Probably this is due to the reliability of harvests by the MAPATA as a result of the traditional irrigation practised to compliment rainfall shortages.

The data emphasise on the importance of rice as a major food crop as well as an exchange crop for the majority of the respondents. This also explains the tendency amongst the coastal dwellers of attaching more value to rice than other crops, which is greatly attributed to the discouragement of diversification in agriculture in those areas.

In many parts of Tanzania, rainfall is erratic and inadequate (Chiza, 1999). Rice production amongst the MAPATA therefore depends on both irrigated and rain-fed systems relying on the perennial Milola river and its tributary which traverse Kinyope Village. The village possesses a river plain of about 300 ha., which is potential for rice production. However, the Non-MAPATA members on the other hand are found outside the Milola River plain and thus rice cultivation is completely dependent on rain-fed systems. The other crops grown included maize, sorghum, and cassava.

A high statistically significant ($*P \leq 0.05$) difference between MAPATA and Non-MAPATA respondents regarding the distribution of respondents according to farm characteristics was noted.

4.2.2.1(I) Crop farm size (under rice)

Table 6(II): Farm size per acre under rice in acreage (n=132)

Crop farm size (Acre)	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
Rice	Nr.	%	Nr.	%
0.5 - 1.0	32	48.5	48	72.7
1.1 - 1.5	17	25.7	8	12.1
1.6 - 2.5	11	16.7	7	10.0
2.6 - 4.0	6	9.1	3	46
Above 4.0	0	0.0	0	0.0
Total	**66**	**100.0**	**66**	**100.0**
Chi-square (SPSS)	**9.322**	**df. 3**	**Observed sign 0.025***	
Anova (SPSS)	**F = 7.349**	**df.1**	**Observed sign. 0.008***	

* *Observed statistical significance at 5%*

As for crop farm size results in Table 6(II), the majority 32(48.5%) and 48(72.7%) of respondents from both MAPATA and Non- MAPATA respectively had farms ranging from 0.5 to 1.0 acre. This was followed by 17(25.7%) and 8(12.1%) of respondents from MAPATA and Non-MAPATA, respectively, whose farms ranged from 1.1 to 1.5 acres. It was also observed that 11(17%) and 7(10.6%) of MAPATA and Non-MAPATA respondents respectively had farms ranging from 1.6 to 2.5 acres, whereas none had farms above 4.0 acres.

This reflects the degree of land fragmentation prevailing in the study location. From the results it was found that the farm size distribution amongst the MAPATA was more or less even. On the other hand the data for Non-MAPATA show clustering of respondents around farm size 0.5 to 1.0 acres, which also indicates high degree of land fragmentation. The wide scatter of the farms normally makes them less accessible by extension agents. On the one hand this has negative effects on the adoption of improved agricultural technologies.

On the other hand the poor accessibility of most of Non-MAPATA respondents has contributed to their poor participation in development projects and programmes.

The Chi-square and Anova analyses show that there was a statistically significant. (*P≤0.05) difference between the MAPATA and Non-MAPATA respondents with respect to farm size under rice.

4.2.2.1(II) Crop farm size under maize

Table 6(III): Crop farm size under maize in acreage (n=132)

Crop farm size	MAPATA respondents (N=66		Non-MAPATA respondents (N=66)	
(Acre) Maize	Nr.	%	Nr.	%
0.5 - 1.0	18	27.3	23	34.8
1.1 - 1.5	3	4.5	3	4.5
1.6 - 2.5	2	3.0	8	12.1
2.6 - 4.0	0	0.0	1	1.5
Above 4.0	1	1.5	1	1.5
Total	**24**	**36.4**	**38**	**57.6**
Chi-square (SPSS)	**7.981**	**df. 5**	**Observed sign. 0.157**	
Anova (SPSS)	**F = 3.555**	**df. 1**	**Observed sign. 0.062**	

Note: a/N does not sum to 132 due to missing data.

Regarding crop farm size under maize, 18(27.3%) of the MAPATA respondents owned farms ranging from 0.5 to 1.0 acre. Three respondents (4.5%) had farms ranging from 1.1 to 1.5 acres, whereas only 2(3.0%) had farms ranging from 1.6 to 2.5 acres. For Non-MAPATA respondents, 23(34.8%) had farms under maize ranging from 0.5 to 1.0 acre. Three (4.5%) of them owned farms ranging from 1.1 to 1.5 acres and 8(12.1%) had farms of 1.6 to 2.5 acres. Finally, 1(1.5%) of both MAPATA and Non-MAPATA were having farm sizes above 4.0 acres. No significant difference (P>0.05) was observed.

4.2.2.2 Main sources of Farm labour

Table 7: Respondents' farm labour sources in frequencies (n=132)

Farm Labour Source	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Own family members	63	95.5	62	93.9
Hired labour	17	25.8	10	15.2
Group members	4	6.1	8	12.1
Relatives	3	4.5	3	4.5
Other sources	0	0	1	1.5
Chi-square 4.222	**df. 3**	**Observed significance 0.238**		

Note: Respondents indicated more than one option.

The results in Table 7 reveal that there was almost entire dependence on family labour sources for both MAPATA and Non-MAPATA respondents. Ashimogo (1995) observed the reliance on family labour for farm work predominating in most households in Tanzania. From the findings, 63(95.5%) of MAPATA respondents depended on family as their major source of farm labour. About a quarter 17(25.8%) depended on hired labour, 4(6.1%) depended on informal group members, and only 3(4.5%) depended on relatives for farm labour supply.

Likewise for Non-MAPATA the trend was approximately the same. More than ninety 62(93.9%) of respondents depended on family labour, 10(15.2%) depended on hired labour, and 8(12.1%) depended on informal groups members. Moreover, 3(4.5 %) depended on relatives as their source of farm labour, while only 1(1.5%) depended on other sources, including friends, neighbours and so on.

It is noteworthy that the number of respondents depending on group members was greater with the Non-MAPATA than the MAPATA respondents. It was observed that the Non-MAPATA were using what they locally called *kipelekane* system as one of the ways to help each other. By this system, the farmers rotate from one farm to another pooling together their labour power for realisation of effective work. These groups were built around the existing close friendship, and inability to afford hired labour. It was observed that unmarried women mostly formed these groups. However no significant statistical difference ($P>0.05$) was observed.

4.2.3 Training of respondents

Rutatora and Rutachokozibwa (1995) argue that farmers training is essential if the introduced and/or selected agricultural technologies and practices are to be utilised on a sustainable basis. Most of the farmers training taking place in Tanzania is part of the Train and Visit approach in extension, a package introduced under NARLEP in 1993. The approach is basically institutional and it puts the farmer and his constraints, abilities and needs at the centre of extension efforts (Pickering, 1987), cited by Wambura (1993). Along with that, the approach mobilises the entire extension apparatus and the research system to serve the smallholder farmer. The regular training and visits paid to farmers disseminate innovations and technical recommendations, and take the farmer and its immediate difficulties and potentials as a starting point.

However, following the introduction of participatory approach in extension, the training currently in the study area is done through dialogues. The dialogues make the extension staff and the farmers feel themselves as students as well as teachers, which enable them to

discuss things as equals. Dialogue, being a give and take process, enables the extension staff and the farmers exchange views in the hope of ultimately reaching agreement. According to Kauzeni (1989), the dialogical teaching method, which is a "problem posing approach" as opposed to "problem solving approach", has currently proved to be the only viable and effective training method. This is because it creates chances for the experts to share knowledge and experiences with the clientele.

Table 8: Distribution of respondents by type of courses attended in frequencies (n=132)

Type of Course	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Rice production technology	7	10.6	3	4.5
Rice irrigation technology	7	10.6	3	4.5
Bunds construction technology	13	19.7	5	7.6
Animal production technology	3	4.5	0	0.0
Grain storage technology	0	0.0	0	0.0
No course at all	50	75.8	60	90.9
Chi- square (SPSS)	**12.295**	**df. 5**	**Observed significance**	**0.03***

* *Observed statistical significance at 5%*
Note: Respondents indicated more than one option

Table 8 presents the distribution of respondents by courses attended. Five types of training courses were conducted by various programmes, namely RIPS, NARLEP, ODA, etc. The major concerns in the training courses were rice production, irrigation, bunds construction, animal production, and grain storage technologies. The training was being provided by the then Ministry of Agriculture and Livestock Development at Mahiwa Folk Development

College(FDC), Chilala Folk Development College (FDC) and the Ministry of Agriculture Training Institute (MATI-Mtwara).

However, most of the farmers' training programmes are not continuing any more due to various reasons, including fund delay and fund shortages. This is the case with the courses namely Monthly, Quarterly and On-sight training, which usually used to be sponsored by NARLEP I & II and currently by NAEP II. The majority of courses were conducted at Chilala Folk Development Centre. The choice of the venue was more or less determined by the Ministry as well as the availability of accommodation and the cost of other services.

From Table 8, MAPATA respondents 13(19.7%) attended courses on bunds construction technology as compared to only 5(7.6%) of Non-MAPATA respondents who had attended a similar course. Seven (10.6%) of MAPATA respondents had attended courses on rice production, and 7(10.6%) on rice irrigation technologies, as compared to only 3(4.5%) of Non-MAPATA respondents who had attended each of the mentioned courses. Three (4.5%) of MAPATA respondents had attended a course on animal production technology as compared to none of Non-MAPATA respondent.

The picture drawn from Table 8 is that for each course organised, more MAPATA members attended than Non-MAPATA ($*P \leq 0.05$). This implies that extension staff gave more consideration to MAPATA than to Non-MAPATA members. Laizer (1999) and Swai (1998) made the same observation whereby each of them found that the Participatory Farmers' Group (PFG) members were given more consideration with regard to provision

of information and skills than Non-PFG members to facilitate dissemination and adoption of agricultural technologies and practices.

However, 50(75.8%) of MAPATA respondents and 60(90.9%) of Non-MAPATA respondents had not attended any of the courses mentioned above. The challenge facing the project, the government, and extension programmes is to minimise the gap between those who have attended and those who have not attended any training course. From the above discussion it implies that the trained MAPATA respondents were 16(24.2%) whereas the trained Non-MAPATA respondents were only 6(9.1%). This is an evidence that training to smallholder farmers in rural areas in Lindi District, and Lindi Region is very low. This is also supported by Laizer (1999) who observed that there was a wider gap between those who had attended and those who had not attend any training course.

4.3 Improved rice technologies and practices adopted

4.3.1 General discussion

The Rural Integrated Project Support (RIPS) Programme, an important stakeholder in Kinyope Micro-Irrigation Project, in its 3rd Phase (1994-1998), had one peculiar feature. That was the introduction and emphasis on the use of participatory approach in rural development facilitation.

For instance, the document issued by PPT (Programme Preparatory Team) in 1994 stated clearly that: Rural development is a learning process. Therefore, it cannot be predicted, designed or imposed from above. To start with, we have to learn together with rural

people, and in that learning we develop shared understanding on issues which enable us start doing something with the imperfect knowledge and whatever resources that are at hand. Through networking, monitoring and publishing of hundreds of such local understandings we gradually find out what seems to work. It further stated that, those understandings replicate, attract new collaborators, become formalised into project agreements, expand and bud off new ideas and initiatives in a continuing process of transformation.

Kinyope Micro-Irrigation Project is an example of such initiatives. The name Kinyope was acquired from the nucleus village's name, from which the project started. Kinyope Village is located about 56 Km., West of Lindi town.

RIPS conducted the first PRA meeting with Kinyope villagers sometime in April 1995 to facilitate farmers identify their problems and priorities and find ways of solving them. The erratic and unreliable rainfalls made rice production more unreliable and food insecurity was high. From the meeting it was realised that the Milola River that traverses the village was a potential that could be exploited to solve the water scarcity problem in the paddy farms by building a fender wall to re-orientated the river (Nanai, 1995).

To start with, the villagers requested RIPS to complement their efforts with some Ths. 356,000/= to buy cement. The District Executive Director's Office provided transport and the DALDO's office provided expertise, whereas the villagers provided physical labour. That was just the beginning; however, it became a tradition, that all the decision making

processes which followed later had to base on PRA approach and results of PRA meetings (Rashidi, *et al.*,1995).

The extension workers and farmers' relationship had to a greater extent changed, dialogue was promoted in which the teaching process became a give-and-take and hence things were being discussed in more equal terms. So even when it came to the selection of rice technical package, participatory approach became the major means of communication to win the participation of all the members in the village.

Several workshops, seminars, study tours involving both policy markers, local leaders, researchers and extension staff were organised to create awareness and sensitise the stakeholders on the importance of participatory decision making. Farmers, extension staff, policy makers and other key actors were equipped with PRA tools to enable them conduct farmers' discussions properly on the required appropriate rice technological package and practices.

The extension staff and demonstration farmers after the seminars and study tours selected the Kinyope Micro-Irrigation Project technical package, which meets smallholder farmers' needs and interests (Shani, 1998). This is in line with the nation- wide increased effort to seek greater involvement of smallholder farmers in all stages of agricultural development process through the use of participatory approaches (Keregero, 1988). Gilbert *et al.* (1980) found that increased participation and involvement of smallholder farmers in the process of technology development and transfer, at all possible levels, leads to effective problem solving in all dimensions, e.g., social, economic, institutional and ecological. The next

subsection is about the levels of adoption and reasons for adoption and rejection of various rice technologies and practices.

4.3.2 Levels of adoption of rice technologies and practices

Table 9: Distribution of respondents by adoption of selected improved rice technologies and practices in frequencies (n=132)

Improved rice technology and practices	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Proper seedbed preparation	66	100.0	65	98.5
High yielding variety TXD 88*	16	24.3	4	6.1
Row rice planting*	10	15.2	2	3.0
Wooden row space markers*	8	12.1	2	3.0
Bunds construction*	55	83.3	40	60.6
Manilla strings*	7	10.6	1	1.5
Split fertiliser application*	6	9.1	1	1.5
Use of sickles for paddy harvesting	1	1.5	0	0.0
Appropriate rice grain storage	1	1.5	0	0.0
Average	**18.9**	**28.6**	**12.8**	**19.4**
Chi-square (SPSS) 4.254	**df.8**	**Observed signif. 0.12**		
Anova (SPSS) F = 4.393	**df.8**	**Observed signif. 0.12**		

* *Observed statistical significance at 5% for individual items compared*
Note: Respondents indicated more than one option

Table 9, presents respondents' adoption of improved rice technologies and practices. According to the results, there is an insignificant difference (P>0.05) between MAPATA and Non-MAPATA respondents as regards the adoption of proper seedbed preparation technology and practice.

Sixty-six (100.0%) and 65(98.5%) of MAPATA and Non-MAPATA respondents, respectively, adopted proper seedbed preparation with a gap of only 1(1.5%). However, remarkable variations occurred in the adoption of bunds construction technology and practice whereby 55(83.3%) of MAPATA and 40(60.6%) of Non-MAPATA respondents

adopted it with a difference of 15(22.7%) respondents. The variation here reflects the characteristics of newly joined farmers from the neighbouring areas who had not yet been accessed by the project, but had voluntarily decided to join it.

According to Kafiriti *et al.* (2001), farmers in all the study area have heard of the use of bunds for rice cultivation, but they have not been exposed to the technique. The newly joined farmers mentioned the success of their colleagues to have been the catalyst for them to join the project. Nevertheless, they found it difficulty to adopt the technology because they could not afford to hire the knowledgeable farmers for the bunds construction service (they charged Tshs 10,000/= per acre). However, generally the farmers considered joining Kinyope Micro-Irrigation Project as a step forward.

Moreover, the laborious nature of bunds construction was mentioned by some of the farmers as one of the reasons for not adopting or delay in adopting the technology. The idea was also supported by the extension staff in the project area, and other selected civil servants (DAS, DPLO, DALDO, Zonal Irrigation Officers, etc.) during formal discussions.

In spite of the lack of money to hire people to construct bunds for them, the farmers were aware of the usefulness of bunds in rice production, especially because of the erratic and inadequate rainfall they usually experience. When asked about the importance of bunds technology, many of the respondents argued that they cage river and rain water in the field and a nice integrated weed control measure through what they locally call *kuchabangia*. From Table 9 we observed that only two technologies, namely proper land preparation and bunds construction, had so far been adopted. To the majority of farmers in Kinyope, proper

seedbed preparation is among the traditions of rice farming community in the study area and farmers believe that proper land preparation is basic for increased rice output.

On the basis of the averages in Table 9, the analysis of variance and chi-square, the variation in adoption levels of the rice technical package between MAPATA and Non-MAPATA respondents was not statistically significant ($P>0.05$). However, highly significant statistical differences ($^{**}P\leq 0.05$) were observed in 6 out of the 9 selected technologies and practices compared. The three insignificant items overshadowed the overall effect of the significant ones. Therefore, the overall implication of the results is that there was an approximately swift and more or less equitable dissemination of the rice technical package in the study area.

According to Laizer (1999), the participation of smallholder farmers in the development of rice technical packages and the delivering of the technologies in the package form are promoting even dissemination and adoption. This is also in line with the observation by Teri and Mattee (1987) that the transfer of improved agricultural technologies from research centre to farmers usually fell, and the rate of adoption was becoming far below expectations and requirements due, to among other reasons, the provision of some of the technologies in piece-meal and lack of follow-up at development and utilisation stages.

However, according to Supe (1990), the speed with which the technology is adopted will depend partially on the characteristics and nature of the innovation. Certain farm practices are known to have innate characteristics, which usually speed up their rate of adoption, while others have been found to have retarding factors.

4.3.3 Source of adopted improved technologies and practice

Technologies and practices need to be communicated from the source to the receiver. Failure to communicate technologies and practices has bothered many well-intentioned extension people (Supe, 1990). A source in technology transfer refers to the point of origin of the message; it may be inventors, researchers, change agents, leaders' opinion, etc. In the perspective of this study *source* is used to mean the origin of the technology according to the perception of the farmers. Laizer (1999) observed that the source of appropriate information that addresses their real needs to be one of the current challenges facing the farmers. The author further argues that, this is currently becoming an issue due to the insufficient central government and local authorities' input and the willingness of NGOs, bilateral organisations and local organisation to participate in providing information and undertaking activities at the farmers' environment.

According to Table 10 results, Own sources, RIDEP, National Agricultural and Livestock Extension Rehabilitation Programme (NARLEP), and ARI-Naliendele have been the main sources of improved rice technologies and practices for the study area.

Table 10 shows that 42(63.6%) of MAPATA respondents referred to Kinyope Micro-Irrigation Project as a main source from which they acquired the proper seedbed preparation technology. However, 38(57.6%) of respondents inherited the technology from own sources (ancestors), which implies that the practice to the Kinyope farmers was somehow traditional. As regards to bunds construction technology, 50(75.8%) of MAPATA respondents acquired it from Kinyope Micro-Irrigation Project. Likewise, 31(47.0%) of MAPATA respondents obtained the technology from RIDEP, a development

programme, which had operated in the past sponsored by the British Overseas Development Agency (ODA).

Table 10: Distribution of MAPATA respondents by adopted* improved rice technologies and practices and their specific sources in frequencies (N=66)

Improved rice technology and practices	Kinyope Project		OWN		RIDEP		NARLEP		ARI Naliendele	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Proper seedbed preparation	42	63.6	38	57.6	8	12.1	1	1.5	12	18.2
Bunds construction	50	75.8	2	3.0	31	47.0	0	0.0	11	16.7
Row rice planting	11	16.7	0.	0.0	1	1.5	0	0.0	4	6.1
Wooden row space markers	7	10.6	0.	0.0	0	0.0	0	0.0	0	0.0
Bunds construction	50	75.8	2	3.0	31	47.0	0	0.0	11	16.7
Manilla strings	5	7.6	0	0.0	1	1.5	0	0.0	0	0.0
Split fertilisers application	2	3.0	0	0.0	1	1.5	0	0.0	0	0.0
Use of rice sickles	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Proper grain storage	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

** With reference to Table 10, Adopted means those technologies and practices with percentage (%) level of ≥ 45.*

Note: Respondents indicated more than one option

Table 11, indicates that 57(86.4%) of respondents from amongst the Non-MAPATA had acquired proper seedbed preparation technology from own sources (inherited), 18(27.3%) got the knowledge from Kinyope Micro-Irrigation Project, 15(22.7%) mentioned Agriculture Research Institute-Naliendele (ARI) as a major source, while 17(25.8%) said that they learned proper seedbed preparation from RIDEP. Concerning bunds construction technology 40(60.6%) of respondents got it from Kinyope Micro-Irrigation Project, 13(19.7%) from own sources and 14(21.2%) from Rural Integrated Development Program (RIDEP).

Table 11: Distribution of Non-MAPATA respondents by adopted* improved rice technologies and their specific sources in frequencies (N=66)

Improved rice technology and practices	Kinyope Project		OWN		RIDEP		NARLEP		ARI Naliendele	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Proper seedbed preparation	18	27.3	57	86.4	17	25.8	0	0.0	15	22.7
HYV.TXD 85	4	6.1	0	0.0	1	1.5	0	0.0	1	1.5
Row rice planting	2	3.0	0	0.0	1	1.5	0	0.0	1	1.5
Wooden row space markers	3	4.5	0	0.0	0.	0.0	0	0.0	0	0.0
Bunds constrution	40	60.6	13	19.7	14	21.2	0	0.0	0	0.0
Manilla strings	0	00	0	0.0	0	0.0	0	0.0	0	0.0
Split fertilisers application	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0
Use of rice sickles	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Proper grain storage	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

* *With reference to Table 11, Adopted means those technologies and practices with percentage (%) level of ≥ 45.*

Note: Respondents indicated more than one option

From Tables 10 and 11 above, it can be concluded that the general trend is that there was high adoption of those technologies and practices, which respondents had learned from more than one source. The findings are in line with those of Laizer (1999) who observed high adoption of technologies and practices, which the respondents learned from various sources. Likewise, Engel (1990) found that farmers and extension agents' access to multiple sources of information was a key to effective transfer and adoption of agricultural innovations.

It is noteworthy that even the Non-MAPATA members had access to Kinyope Micro-Irrigation Project services. This indicates that the rest of the farmers were also benefiting from the spillovers of the project. However, the same also reflects the lack of permanence in the MAPATA membership because the majority of farmers do not own the plots, rather

they hire them on annual basis from the few landlords who frequently kick them out of their plots after harvests to find themselves joining with the army of non-MAPATA members. These circumstances also threaten the success and life of MAPATA since membership is constantly changing.

4.3.4 Reasons for respondents adopting improved rice technologies and practices

In the previous subsection, the level of adoption and sources of improved technologies and practices for Kinyope Micro-Irrigation Project were explicitly discussed. This sub-section considers the reasons given by the extension staff, key informants through formal discussions and the farmers for adopting improved rice technologies and practices. It should be remembered and re-emphasised that the speed with which the technology is adopted depends partly on the characteristics and on the nature of the technology itself. Certain farm practices have inherent characteristics, which hasten their rate of adoption. On the contrary, others may have retarding factors. For instance, high costs slow down adoption; farmers will tend to go for less costly technology as it involves fewer risks. Simplicity and easily understandable technologies are more preferred than complex ones. Visibility or observability is another important aspect in technology adoption also whereby the more visible or showy the technology is, the higher is the adoption speed. Besides that, a practice that is divisible for trials will generally be adopted more rapidly than a practice that is not.

Table 12: Distribution of MAPATA respondents according to adopted improved rice technologies and reasons for adoption in frequencies (N=66)

Improved rice technologies and practices	Reasons											
	Previous technology is not better		Technology is consistent with past		Technology is simple		Technology is triable		Technology is observable		Total	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Proper seedbed preparation	1	1.5	3	4.5	30	45.5	15	22.7	17	25.8	66	100.0
Bunds construction	3	4.5	5	7.6	12	18.2	20	30.3	15	22.7	55	83.3
Average	**2**	**3.0**	**4**	**6.1**	**21**	**31.9**	**18**	**27.3**	**16**	**24.3**	**61**	**92.4**
Chi-square (SPSS)	**45.007**		**df. 4**		**Observed sign. 0.000***							
Anova(SPSS)	**F = 48.728**				**df. 4**				**Observed sign. 0.000***			

Table 12 provides a category of technologies adopted by the MAPATA respondents by which 30(45.5%) adopted proper seedbed preparation because of its simplicity, 17(25.8%) had opted it because the technology is observable or showy, 15(22.7%) had decided to adopt the technology because of its triability, and 3(4.5%) because the new technology was consistent with the past technology.

Insofar as bunds construction technology is concerned, 20(31.3%) of MAPATA respondents adopted it because it was triable, while 15(22.7%) adopted it because it was observable. Furthermore, 12(18.2%) adopted the bunds construction technology because it was simple, 5(7.6%) because it was consistent with the past and 3(4.5%) because the technology was better than the previous one. The total adoption level being 55(83%).

With respect to Non-MAPATA respondents, Table 13 shows that 32(48.5%) of Non-MAPATA respondents adopted proper seedbed preparation technology because the previous technology was not better and 18(27.3%) adopted the new technology because it was simple. Moreover, 10(15.2%) adopted proper seedbed preparation because the technology was consistent with the past, 4(6.1%) because the technology was observable and 2(3.0%) because of the triability of the technology. The reasons for adoption by MAPATA and Non-MAPATA respondents were almost the same.

Table 13: Distribution of NON-MAPATA respondents according to adopted improved rice technologies and reasons for adoption (N=66)

Improved rice technologies and practices	Reasons											
	Previous technology is not better		Technology is consistent with past		Technology is simple		Technology is triable		Technology is observable		Total	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Proper seedbed preparation	32	48.5	10	15.2	18	27.3	2	3.0	4	6.1	66	100.0
Bunds construction	21	31.8	8	12.1	2	3.0	2	3.0	10	15.2	43	65.2
Average	**27**	**40.9**	**9**	**13.6**	**10**	**15.2**	**2**	**3.0**	**7**	**10.6**	**55**	**833**
Chi-square (SPSS)	**45.007**			**df. 4**			**Observed sign. 0.000***					
Anova (SPSS)	**F = 48.728**			**df. 4**			**Observed sign. 0.000***					

a/N does not sum to 132 because it includes adopted technologies only

Through discussions most of the extension staff mentioned the increased output per unit area, water management and weed control as the major reasons for adoption of bunds technology. The same reasons were also mentioned by most of the selected civil servants by virtue of their positions; namely the District Administrative Secretary (DAS) for Lindi,

District Extension Officer (DEO). District Agricultural and Livestock Development Office (DALDO), etc.

Regarding the Non-MAPATA respondents bund construction technology adoption, 21(31.8%) of respondents adopted bunds technology because the previous technology (without bunds) was not good. Moreover, 10(15.2%) had adopted bunds technology due to its observability, while 2(3.0%) said that the technology was simple. The total adoption level of bunds technology amongst the Non-MAPATA was 43(65.2%). Similarly, the reasons given by MAPATA and Non-MAPATA respondents for adoption of bunds technology were nearly the same. However, it can be noted that there was an adoption gap of 12(18.2%) respondents more for MAPATA as compared to Non-MAPATA respondents. This implies that in general there was a highly statistical significant difference ($*P \leq 0.05$) in adoption of improved technologies between MAPATA and Non-MAPATA respondents. This reflects the high access to extension services experienced by the MAPATA as compared to Non-MAPATA respondents.

Generally the reasons given by both the MAPATA and Non-MAPATA are in line with the findings by Morrison (1984) and Rogers (1995), which indicated characteristics of innovations to be very important in adoption. However, there are many other situations in which farmers find it difficult to adopt innovations. These include resources position and personal values as they tend to influence farmers' goals and behaviour.

4.3.5 Reasons for rejecting rice technologies and practices

Table 14: Distribution of respondents according to types of rejected improved technologies and reasons for their rejection in frequencies (n= 132)

Improved rice technologies and practices	Reasons											
	Previous technology is better		Technology is inconsistent with past		Technology is difficult		Technology is not triable		Technology is not observable		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
MAPATA respondents (N=66)												
HYV.TXD.85 etc.	51	77.3	0	0.0	4	6.1	9	13.6	2	3.0	66	100.0
Row rice planting	3	4.5	0	0.0	54	81.8	5	7.6	4	6.1	66	100.0
Wooden row space markers	1	1.5	0	0.0	42	63.6	16	24.2	6	9.1	65	98.5
Manilla strings	1	1.5	0	0.0	42	63.6	13	19.7	10	15.2	65	98.5
Split fertiliser application	38	57.6	0	0.0	6	9.1	18	27.3	3	4.5	65	98.5
Sickle for paddy	12	18.2	1	1.5	5	7.6	30	45.5	10	15.2	58	87.9
Appropriate rice grain storage	13	19.7	0	0.0	4	6.1	24	36.4	21	31.8	62	93.9
Average	17	25.8	0.14	0.21	22.4	34.0	16	24.8	8	11.6	63.9	96.7
Non-MAPATA respondents (N=66)												
HYV.TXD.85 etc.	55	83.3	0	0	2	3	5	7.6	1	1.5	63	95.5
Row rice planting	0	0.0	0	0	55	83	8	12.1	2	3.0	65	95.5
Wooden row space markers	0	0.0	0	0	47	71	12	18.2	7	10.6	61	92.4
Manilla strings	0	0	0	0	44	66.7	18	27.3	4	6.1	66	100.0
Split fertiliser application	31	47.0	0	0	2	3	30	45.5	3	4.5	66	100.0
Sickle for paddy	15	22.7	0	0	3	4.5	38	57.5	10	15.2	66	100.0
Appropriate rice grain storage	18	27	0	0	3	4.5	29	43.9	16	24.2	66	100.0
Average	17	25.6	0	0	22	33.7	20	30.2	6	9.1	64.7	97.6
Chi-square(SPSS)			3.199		df. 24		observed sign. 0.38					
Anova(SPSS)			F = 0.856		df. 24		observed sign. 0.51					

As it can be seen from table 13, the number of technologies adopted is very small. Only two technologies had been adopted so far which, obviously, means a big number of them had been rejected. Table 14 presents the improved rice technologies and practices rejected by MAPATA as well as Non-MAPATA respondents and the reasons for the rejection. MAPATA and Non-MAPATA respondents had rejected 7 technologies from the selected

rice technological package. There is an insignificant difference (P>0.05) in the levels of rejection of rice technologies and practices. Whereas the average rejection level for MAPATA respondents was 63.9(96.7%), that of Non-MAPATA respondents was 64.7(97.6%) making the difference on average of 0.8(0.9%), which is almost negligible. In spite of the mentioned rejection-gap, the percentage profile of technologies and reasons for rejection were roughly the same. For instance, MAPATA respondents on average had rejected the technologies because they were difficult, and previous ones being better than the new ones by 22.4(34.0%) and 17(25.8%), respectively. The Non-MAPATA respondents had rejected the same technologies for the same reasons by 22(33.7%) and 17(25.8%) on average, respectively.

In general from Table 14 data analysis, there was no meaningful statistical difference (P>0.05) among reasons for rejection given between MAPATA and Non-MAPATA respondents. Nevertheless, there was evidence that simplicity of some of the rice technologies was a crucial attribute, which enhanced adoption. This is in line with the observations by Morrison (1984) and Rogers (1995), which indicate that characteristics of innovations are very important in adoption. The idea also was supported by 54(81.8%), and 42(63.6%) of MAPATA respondents as well as 55(83.3%), 47(71.2%) and 44(66.7%) of Non-MAPATA respondents concerning the rejection of row rice planting, wooden row space markers and manilla string application, respectively. On the other hand, the majority of extension staff mentioned inadequate capital and financial resources, drudgery involved in some of the technologies, newness of the technologies, taste of a particular variety of rice, and cost aversion as reasons for not adopting most of the improved rice technologies in the package. On the other hand most the key informants interviewed mentioned

inadequate capital and financial problems as factors obstructing technology adoption. Moreover, De Vries (1976) also found that recommendations, particularly those involving high cash expenditures, were mostly followed by rich farmers, and the farmers with high degree of extension contact in all subgroups. Briefly, the adoption or rejection of agricultural technologies is a function of a multiplicity of factors and situational constraints

4.4 Effect of adoption of rice technology on respondents' rice yields.

4.4.1 Profile of rice ecosystems in Lindi District.

Rice, is an important food crop in South Eastern Tanzania. It is ranking fourth in order of importance after maize, cassava and sorghum (URT, 1992), cited by Kafiriti *et al.* (2001). The demand for rice in Lindi and Mtwara regions is increasing as a result of a dietary shift from maize and cassava. However, in spite of the important role rice plays in food security, yields under farmers' conditions are low (Kafiriti *et al.*, 2001). Like in other parts of Tanzania, Lindi Region has three rice production ecosystems; namely lowland rain-fed, lowland irrigated and upland ecosystems. Over 60% of the rice production is not irrigated, and the yields are strongly affected by the variability of rainfall, resulting in frequent crop loss or depressed crop yields due to either flood damage or drought (Binnie and Partners, 1980), cited by Kafiriti *et al.* (2001).

The rainfall variability in Lindi District affects the duration and the on-set of the growing period per year. Rice in Lindi District is grown by smallholder farmers under rain-fed and a combination of rain-fed and irrigated conditions. In view of the prevailing erratic rainfall, one would have expected more rice to be cultivated in valleys taking advantage of the available water from rivers Lukuledi, Milola, Mbwemkulu and many others. Nevertheless,

the potentials offered by most of these valleys are under-utilised (Kafiriti *et al.*, 2001). On the basis of water management and some cultural practices, the study area's rice ecosystems in the district are divided into bunded and unbunded irrigated under the MAPATA organisations, and the bunded and unbunded rain-fed flooded sub-ecosystems under the Non-MAPATA.

The rice varieties grown are mainly *Supa India, Tunduru* and partially *Kihogo* and *Sifara*, which are local varieties. However, currently, trials are being made by the Agricultural Research Institute (ARI) Naliendele involving the farmers to provide an opportunity for smallholder farmers to acquire new varieties suitable to their farming systems. Thirteen improved varieties were involved in the trials including *Rangi Mbili, Kihogo Red Selection No. 7, Supa Utafiti, Naro Fupi, Agulha, TXD 220, TXD 282, TXD 299, TXD 306, TXD 213, TXD 88, TXD 85, and Subarimati.*

The PRA meetings conducted in succession by RIPS staff from 1995 onwards and the study tours made to Dodoma and Singida Regions, played an important role in the development of the Kinyope Micro-Irrigation Project recommended rice technical package. As it has been seen, the developed package has been adopted especially the proper land preparation and bunds construction technologies whose impact is felt through increased rice yields, which have attracted the neighbouring and even distant villagers to replicate.

4.4.2 Rating adoption of rice technologies and yields

The rate of adoption is the relative speed with which an innovation is adopted by the members of a social system. It is measured by the length of time required for a certain

percentage of members of a system to adopt an innovation. The normal rate of progress according to Supe (1990) might require from six to ten years, that is, between the introduction of the innovation and its adoption throughout the community.

Table 15: Distribution of respondents according to rating of levels of adoption of improved rice technologies and yield improvement (=132)

Rating level	MAPATA respondents (N=66)		Non- MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Adoption				
Increased	65	98.5	56	84.9
Decreased	0	0.0	1	1.5
No change	1	1.5	9	13.6
Total	**66**	**100.0**	**66**	**100.0**
Chi-square(SPSS)	**10.820**	**df. 2**	**Observed signif. 0.04***	
Anova(SPSS)	**F = 11.276**	**df.1**	**Observed signif. 0.001***	
Rice yields				
Increased	57	86.4	39	59.i
Decreased	3	4.5	9	13.6
No change	6	9.1	18	27.3
Total	**66**	**100.0**	**66**	**100.0**
Chi-square(SPSS)	**11.226**	**df. 3**	**Observed signif. 0.01***	
Anova(SPSS)	**F = 7.517**	**df. 1**	**Observed signif 0.007***	

Table 15 shows that 65(98.5%) and 57(86.4%) of MAPATA respondents' viewpoint is that there has been an increase in adoption of rice technologies and yields, respectively. Fifty-six (84.9%) and 39(59.1%) of Non-MAPATA respondents also had similar observations. The analysis shows that there was an adoption gap of 9(13.6%) between the MAPATA and Non-MAPATA respondents, which suggests that MAPATA members had higher access to extension services as compared to the disorganised and widely scattered Non-MAPATA members. The gap is also reflected in the rating of the yields whereby there was 18(27.3%) of respondents more with the MAPATA, which emphasises the advantage they had concerning access to extension services. The analysis, therefore, indicates the existence of

a significant statistical difference in rating the adoption (*P≤0.05) of improved rice technologies and yields (*P≤0.05) between the MAPATA and Non-MAPATA respondents. Information collected from discussions held with extension staff and key informants in Lindi and Mtwara Regions also supported the idea. This implies that the flow of improved rice technologies and practices had a bias in favour of MAPATA members. However, both MAPATA and Non-MAPATA respondents had a similar feeling that there has been a positive change in adoption and rice yields among them. Elsewhere, Mngodo (1997), cited by Laizer (1999) also had the same observation about the adoption of improved rice technology and the associated increase in yields. However, 9(13.6%) of Non-MAPATA respondents had the view that there was no change in improved technologies adoption as well as in rice yields 18(27.3%) in Kinyope.

4.4.3 Attained average rice yields per acre

According to national statistics, the average rice yield (paddy) in Tanzania is 1.74 tons/ha, which is equivalent to 22 eighty-kilograms bags/ha (FAO, 1994). This is higher than Lindi Regional rice yields average, which stands at 1 ton/ha, which is equivalent to 12 to 13 bags/ha. The Lindi District average rice yield level is approximately equal to that of the region. However, with the introduction of the Kinyope Micro-Irrigation Project the output per acre within the study area has gone up from 7 to 25 bags (Kafiriti *et al.*, 2001).

Table 16: Distribution of respondents according to attained rice yields levels per acre (n=132)

Rice yields ranges bags per acre	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
4 - 8	20	30.3	47	71.2
9 - 13	21	31.8	16	24.2
14 - 20	16	24.2	3	.45
21 - 25	7	10.6	0	0.0
26 - 40	2	3.0	0	0.0
Total	**66**	**100.0**	**66**	**100.0**
Chi- square (SPSS)	**29.451**	**df. 4**	**Observed signif.**	**0.000***
Anova (SPSS) F = 35. 890		**df. 1**	**Observed signif.**	**0.000***

- NB. 1 bag of paddy = 80 kg.

Table 16 shows that, 20(30.3%) and 47(71.2%) of MAPATA and Non-MAPATA respondents, respectively had the yield range of 4 to 8 bags of rice per acre. Whereas 37(56.1%) of MAPATA respondents had the yield range of 9 to 13 and 14 to 20 bags per acre, only 19(28.7%) of Non-MAPATA respondents were recorded respectively. Only 9(13.6%) of MAPATA and none of the Non-MAPATA attained yield averages above 21 bags. This implies that there is a highly significant statistical ($*P \leq 0.05$) difference in yields attained between the MAPATA and Non-MAPATA respondents. Partly this is reflecting the rapid but uneven flow and adoption of improved rice technologies and practices between the two.

However, the results also reflect the advantages the irrigated MAPATA rice production has over the rain-fed Non MAPATA one, which sometime is badly affected by the erratic and unreliable rainfall. This is in line with Nozaka (2001 unpublished) who argues that, in areas with unreliable rainfall supplementary irrigation of rice is necessary. The same has

also been observed by Kafiriti *et al.* (2001), that recent changes in climate, especially the amount of rainfall received in South Eastern Tanzania, have seriously affected utilisation of some of the valleys and river plains for rice production.

Thus the MAPATA farmers sometimes are compelled to supplement the rainfall shortage gaps by irrigation, which is not possible with the totally rain-fed Non-MAPATA farmers. Of course, bunding technology is practised also by the majority of Non-MAPATA farmers to harvest rainwater to sustain the crop for a longer period. Nevertheless, during acute rain shortages the bunds have proved to be not very much useful.

4.4.4 Frequency of visits paid by VEOs and GDFs

A Village Extension Officer (VEO) is an individual who is fully employed and engaged in agricultural extension work in rural communities. The term refers to the staff employed by the Ministry of Agriculture and Food Security and its parastatal agencies, including people dealing with livestock development. On the other hand, extension means to extend, to spread or disseminate useful information and ideas to the rural people outside the regularly organised schools and classrooms (Supe, 1990). Extension education is an education programme for the people based on their needs and problems. It is designed to meet these needs and solve the problems on a self-help basis. The importance of agricultural extension is that the farmers need to be supplied with recent, useful and practical information related to agriculture. Therefore, extension is concerned with the development of the ability of the farmers to understand and adopt various technologies.

In Kinyope Micro-Irrigation Project the GDF is a very close partner of VEO in the process of transferring the selected rice technical package to MAPATA and Non-MAPATA farmers. The VEO is a benefactor of the farmers and a link with other stakeholders interested in assisting smallholder farmers to solve the rice production constraints at the grassroots level. Mbwana (1995), cited by Laizer (1999), observed that lack of visits of extension agents to farmers and poor linkage with other relevant partners affected the transfer of technologies and technical information to smallholder farmers at the local level.

Table 17: Distribution of respondents according to frequency of visits paid by VEOs and GDFs(n=132).

Frequency of paying visits	MAPATA respondents (N=66)		Non-MAPATA respondents(N=66)	
	Nr.	%	Nr.	%
VEOs				
Once a week	1	1.5	0	0.0
Once a month	10	15.2	11	16.7
Thrice a month	26	39.4	10	15.2
We visit VEOs on need basis	11	16.7	9	13.6
No visit at all	18	27.3	36	54.5
Total	66	100.0	66	100.0
Chi- square(SPSS)	27.557	df. 5	Observed signif.	0.000*
GDFs				
Once a week	0.	0.0	0	0.0
Once a month	0.	0.0	0	0.0
Thrice a month	2	3.0	0	0.0
We visit GDFs on need basis	4	6.1	12	18.2
No visit at all	60	90.9	54	81.8
Total	66	100.0	66	100.0
Chi-square(SPSS)	8.086	df.	Observed signif.	0.044*

Table 17 presents the results of frequency of visits paid by VEO and GDFs, respectively, to farmers. The results display that a total of 37(56.1%) of MAPATA respondents were visited by VEOs once per week, once per month and thrice a month as compared to

21(31.9%) of the Non-MAPATA respondents who were visited by VEOs once and thrice a month. While 11(16.7%) of MAPATA and 9(13.6%) of Non-MAPATA respondents visited the VEOs on need basis, very few 4(6.1%) MAPATA and 12(18.2%) of Non-MAPATA respondents visited the GDFs on need basis.

It is noteworthy from these results that there was a strong statistical evidence ($*P \leq 0.05$) that the MAPATA respondents were being favoured in terms of visits paid by VEOs as compared to the Non-MAPATA. Moreover, it is shown that the number of Non-MAPATA respondents visiting the GDFs was greater than that of the MAPATA. This reflects the potentials available of the possible increased creation and use of GDFs to complement the VEOs services to counter the shortages prevailing in the rural areas in Tanzania.

The implication of the shortage of VEOs to the visits paid to farmers is that the number of visits made becomes highly minimised. A survey made by the World Bank in 1992 revealed that, in the seven villages surveyed only 50% of the farmers contacted were aware of the scheduled visits by extension agents; this went as low as 22% in Lindi and 6% in Mtwara (Shechambo and Kalundwa, 1995).

In the studied area, for instance, at the time these data were collected at Kinyope, there was only one VEO stationed at the Ward headquarters providing extension services to more than five villages. The VEO to farm families ratio was approximately 1: 4,000 as against to 1:2500, the ratio for most developing countries (Roling, 1988). Data from secondary sources *(Appendix XII)* also indicate that, Lindi District had 23 wards and 102 villages which were being attended by only 23 VEOs, the VEO to Villages ratio being

approximately 1: 4.5. Kinyope Village in spite of being a centre of spread of Kinyope Micro-Irrigation Project technical package, and an important Participatory Farmers' Training Centre in the Southern regions of Tanzania, had no VEO of its own. The previous VEO had been transferred to another ward, and the replacement was operating from the Ward headquarters in Rutamba on, an on-and-off basis. Therefore, the farmers change agents and policy makers visiting the village from other villages, districts, regions and even from outside the country were getting orientation from the few GDFs available in the village. However, Rutachokozibwa (1995) observed that the dissemination of technical information at the local level in Tanzania is low because there are very few trained demonstration farmers and limited participation of the farmers in the whole technology development, transfer and utilisation paradigm. Under such circumstances obviously the VEO/GDFs-farmers contacts are automatically minimised, which further obstructs the transfer and diffusion of improved agricultural technologies at the expenses of agriculture and rural development. In spite of that, calls are currently being made for closer involvement of farmers to cut down time between development and utilisation of agricultural innovations (Laizer, 1999).

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

Agricultural Extension Approach uses extension-teaching methods for educating the people. The effective extension worker must not only have at his command a variety of tools and methods of communicating information, but must know where to use them, when to use them and how to use them Kauzeni (1989). Farmers are influenced to make changes in farming practices, attitudes and behaviour towards farming in direct proportion to their

contact with several agricultural extension methods. Kelsey (1963), cited by Kauzeni (1989), observed that as the number of methods of exposure to extension information increased from one to nine, the number of farm families, which change behaviour increased from 35% to 95%. Thus, the selection and use of extension approaches in any situation is a question of establishing relationships between selected means and ends.

The problem is to determine how a particular group of farmers can be moved from the awareness stage for instance, to adoption stage as quickly as possible. According to Supe (1990), the trick is to get more informal leaders to become early adopters and more early adopters to become innovators. This can be done when people have confidence in the extension worker. The confidence, according to the author, can be achieved by providing the farmers satisfying experiences. However, to achieve that Kauzeni suggests that the extension staff should make use of different extension approaches.

Basically, extension approaches are divided into three major groups, namely personal contacts which include *face-to-face*, group methods which involve meetings for example *demonstrations*, etc., and mass methods which entail *written* or *spoken* words. Currently, participatory approach in agricultural extension is highly advocated whereby active participation and involvement of smallholder farmers in the assessment, analysis, and action are important (Temu and Due, 1996). The facilitator under participatory approach strives to help farmers to deliberate information by joining with the farmers in translating information and in selecting what to use. Kinyope Micro-Irrigation Project in Lindi Region, which is participatory in nature, has throughout been using *MAPATA meetings*, on farm *demonstrations*, *workshops*, *seminars*, *field days* and *trained farmers* to promote

clientele participation in the development, transfer and application of improved rice technologies and practices.

Table 18: Respondents' views on approaches applied by extension staff to facilitate adoption of improved rice technologies and practices in frequencies (n=132)

Approaches/	At least thrice a month		At least once a month		At most twice per season		Not at all	
Respondents	Nr	%	Nr.	%	Nr.	%	Nr.	%
MAPATA respondents (N=66)								
MAPATA meetings*	1	1.5	10	15.2	11	16.7	44	66.7
Farm demonstration*	22	33.3	8	12.1	22	33.3	14	21.2
Workshop and Seminars	0	0.0	0	0.0	1	1.5	65	98.5
Field days	6	9.1	2	3.0	2	3.0	56	84.8
Trained demo farmers*	8	12.1	5	7.5	9	13.6	44	66.7
Farm visits*	21	31.8	7	10.6	21	31.8	17	25.7
Home visits*	9	13.6	2	3.0	10	15.2	43	65.2
Leaflets*	4	6.1	3	4.5	3	4.5	52	78.8
Average	**8.88**	**13.5**	**4.6**	**7.01**	**9.88**	**14.9**	**41.9**	**63.4**
Non-MAPATA respondents (N=66)								
MAPATA meetings*	1	1.5	1	1.5	7	10.6	57	86.4
Farm demonstration*	12	18.1	5	7.6	14	21.2	35	53.0
Workshop and Seminars	0	0.0	1	1.5	1	1.5	64	97.0
Field days	0	0.0	1	1.5	3	4.5	62	93.9
Trained demo farmers*	2	3.0	1	1.5	1	1.5	62	93.9.9
Farm visits*	10	15.2	5	7.6	17	25.8	34	51.5
Home visits*	1	1.5	4	6.1	7	10.6	54	81.8
Leaflets*	0	0.0	0	0.0	0	0.0	66	100.0
Average	**3.3**	**4.9**	**2.3**	**3.4**	**6.3**	**9.4**	**54.3**	**82.0**
Chi-square(SPSS)	**9. 809**		**df. 21**		**Observed signif. 0.095**			
Anova(SPSS)	**F = 7.161**		**df. 1**		**Observed signif. 0.078**			

* Observed statistical significance at 5%

Table 18 presents the extension approaches applied by VEOs in Kinyope Micro-Irrigation Project to promote the delivery and adoption of the selected rice technical package. One-third [22(33.3%)] and 21(31.8%) of MAPATA respondents said that the extension agents used mostly farm demonstrations, and farm visits respectively at least thrice a month to

facilitate transfer and adoption of improved rice technologies. Twelve respondents (18.2%) and 10(15.2%) Non-MAPATA respondents on the other hand mentioned on farm demonstration and farm visits, respectively, as the most used extension approaches at least thrice a month.

Farm demonstrations and farm visits have been repeatedly mentioned as extension approaches used most frequently by the extension staff to facilitate transfer and adoption of rice technologies and practices. From Table 18 11(16.7%), 22(33.3%) and 21(31.8%) MAPATA respondents emphasise that MAPATA meetings, farm demonstration and farm visits, respectively, were being used at most twice per season. Also, 14(21.2%) and 17(25.8%) of Non-MAPATA respondents stressed on the use of farm demonstrations and farm visits, respectively at most twice per season.

The two with different scores have been repeated again to give more weight for their being used to facilitate transfer and adoption of rice technologies and practices in Kinyope Micro-Irrigation Project. Generally, farm demonstrations and farm visits seem to be preferred most by both the Ministry of Agriculture and Food security and Kinyope Micro-Irrigation Project.

Farm visit in particular is very effective because it often takes place at the learner's farm and amid his familiar surroundings. Visits increase interest and eliminate misunderstandings. Farm visit being a face-to-face contact on the farm gives a VEO an opportunity to increase the ability in giving information and advice to the farmer. However, farm visit approach has a number of limitations. It is the most *expensive* method

in terms of both time and efforts. Given that the VEO will have to move from one farm to another he can cover relatively few farmers and thus it limits the number of possible contacts also. The method works nicely in the availability of large number of extension officers at the village level, which is not the case with Tanzania where the extension staff to farmer ratio is approximately 1: 4000. Sometimes there is a tendency of VEOs to visit the farmers who only have something in common with the extension worker, that is those from whom he/she gets rewards and pleasure when he/she visits. Probably the difference in visits (Table 18) as mentioned by the respondents whereby some are visited thrice a month and others at most twice per season may be validating this allegation.

Experience reveals that farm *demonstration* is used as a starting point to establish consultations between smallholder farmers and other key actors (Laizer, 1990). Demonstrations are thus powerful tools in agricultural extension service. They differ from other methods of extension in so far as they help to *convince people* more quickly than any other methods through the *triple process* of *observing, hearing*, and *learning by doing* and experiencing things for oneself.

Demonstrations are public displays emphasising the salient merits, utility and efficacy of a practice or process. They initiate the process of learning, motivating, and encouraging one to change habits, customs, tradition and practices and thereby help to build progressive attitudes. Ashby (1990) found that, the collaborative modes of participation are used to get farmers' reactions to prototype technologies earlier, whereas consultative modes are used to involve farmers later in the technology development process. Many farmers, extension

staff, party officials and civil servants interviewed, highly appreciated the work done by the previous, transferred VEO as far as farm visits and demonstrations are concerned.

From Table 18, the use of *trained demonstration farmers* has not scored high marks in MAPATA 8(12.1%) at least thrice a month, 9(13.6%), at most twice per season) and below 3(3.5%) for Non-MAPATA, which indicates that the approach was not a very common practice. However, the approach was recognised and used mostly by MAPATA respondents as one of the extension approaches probably this was caused by the bias in favour of the MAPATA during the selection of the farmers to be trained. Roling (1990) observed that it is a normal practice in extension to use the farms of the progressive farmers to demonstrate to others how they can improve their work, with the expectation that other farmers from different socio-economic groups in the community will imitate so that extension efforts spent on few farmers are multiplied many times over. It is noteworthy that when discussing about the frequency of visits paid (Table 17), it was found that the trained demonstration farmers were mostly being contacted by Non-MAPATA respondents but on need basis. This implies that the extension staff was not using the approach officially.

Field days approach has also scored lowly {[6(9.1%), 2(3.0%), and 2(3.0%)] and [0(0.0%), 1(1.5%) and 3(4.5%]} as an approach used at least thrice a month, at least once a month, and at most twice per moth in both MAPATA and Non-MAPATA respectively, indicating that it was a foreign element since it was mostly being used by Seed Trials Project carried out by ARI-Naliendele, which by then was going on. *Workshops* and *seminars* were rare due to financial constraints. In most cases they were being organised

either by the Agricultural Department in the District, RIPS, NGOs, the Region, *etc.* About 65(98.5%) of MAPATA, and 64(96.6%) of Non-MAPATA respondents mentioned Workshops and seminars as being not among the extension approaches used by extension staff.

In spite of the recognition of the importance of printed materials, 52(78.8%) of MAPATA and 66(100%) of Non-MAPATA respondents indicated that extension staff had not used *leaflets* to facilitate dissemination and adoption of rice technologies. Laizer (1990) observed financial constraints facing extension staff to be the reason for leaflets not being used by extension staff. However, in extension service provision, simple leaflets and pamphlets are a valuable tool in the hands of an intelligent extension worker. The best leaflets give accurate and specific instructions on how to do a job (Supe, 1990).

According to MAPATA respondents MAPATA *meetings* were mentioned by 10(15.2%) and 11(16.6%) as being used at least once a month and at most twice per month, respectively. Whereas for Non-MAPATA, MAPATA meetings were mentioned by 1(1.5%) and 7(10.6%) as being used at least once a month and at most twice per month, respectively, reflecting the presence amongst the Non-MAPATA of farmers who were members of the MAPATA in the past seasons. Meetings usually provide the forum for involving farmers in discussions leading to problem solving and decision making through dialogues.

In brief, the analysis indicates that there was no overall significant statistical difference ($P>0.05$) in the frequency of used extension approaches between MAPATA and Non-

MAPATA respondents. However, statistically significant differences (**P≤0.05) were observed amongst the individual items compared.

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

Table 19: Perception of MAPATA respondents on factors, which prevented adoption of, improved rice technologies in frequencies (N=66).

Factors	Agree		Disagree		Don't know	
	Nr.	%	Nr	%	Nr.	%
Institutional						
Technologies not available	55	83.3	10	15.2	1	1.5
Technologies do not improve production*	15	22.7	50	75.8	1	1.5
Unreliable stockists*	62	93.9	4	6.1	0	0.0
Inadequate credit facility	64	97.0	2	3.0	0	0.0
Inadequate VEO advice*	60	90.9	6.	9.1	0	0.0
Ecological						
Unfavourable weather conditions*	15	22.7	51	77.3	0	0.0
Socio-economic						
Many household obligations*	44	66.6	22	33.3	0	0.0
Inadequate money to buy inputs	63	95.5	2	3.0	1	1.5
Technologies too expensive*	42	63.6	22	33.3	2	3.0
Lack of reliable market*	6	9.1	60	90.9	0	0.0
Low price for paddy*	19	28.8	44	66.7	3	4.5
Lack of transport facility	6	9.1	40	60.6	22	33.3
Inadequate tractors	3	4.5	61	92.4	3	4.5
Unco-operative GDF	51	77.3	13	19.7	2	3.0
Average	36	54.7	27.6	42	2.5	3.8
Chi-square (SPSS) 9.579 df.13 Observed signif. 0.1						
Anova (SPSS) F = 6.471 df. 13 Observed signif. 0.1						

* *Observed statistical significance at 5%*
Note: Respondents indicated more than one option

Table 20: Perception of Non-MAPATA respondents on factors, which prevented adoption of, improved rice technologies in frequencies (N=66).

Factors	Agree		Disagree		Don't know	
	Nr.	%	Nr.	%	Nr.	%
Institutional						
Technologies not available*	62	93.9	4	6.1	0	0.0
Technologies do not improve production	26	39.4	35	53.0	6	9.1
Unreliable stockists*	47	71.2	3	4.5	16	24.2
Inadequate credit facility	60	90.9	3	4.5	3	4.5
Inadequate VEO advice	62	93.9	1	1.5	3	4.5
Ecological						
Unfavourable weather conditions	33	50.0	27	40.9	6	9.1
Socio-economic						
Many household obligations*	58	87.9	6	9.1	2	3.0
Inadequate money to buy inputs*	64	96.9	2	3.0	0	0.0
Technologies too expensive*	58	87.9	5	7.6	3	4.5
Lack of reliable market*	26	39.4	39	59.1	1	1.5
Low price for paddy*	43	65.2	22	33.3	1	1.5
Lack of transport facility	3	4.5	33	50.0	30	45.5
Inadequate tractors	8	12.1	53	80.3	5	7.6
Unco-operative GDF	58	87.9	8	12.1	8	12.1
Average	**43**	**65.2**	**17**	**25.8**	**6**	**9.1**
Chi-square (SPSS)	**9.579**	**df. 13**	**Observed signif. 0.1**			
Anova (SPSS)	**F = 6.471**	**df. 13**	**Observed signif. 0.1**			

* *Observed statistical significance at 5%*
Note: Respondents indicated more than one option

Tables 19 and 20 present categories of factors hindering the adoption of the improved rice technologies by the interviewed respondents for MAPATA and Non-MAPATA respondents. The factors are viewed in institutional, ecological and socio-economic perspectives.

From Tables 19 and 20 we observe that socio-economic factors, which prevented the adoption of improved rice technological package in Kinyope Micro-Irrigation Project for MAPATA and Non-MAPATA respondents respectively, included: Inadequate money to buy inputs [63(95.5%), and 64(96.9%)], unco-operative GDFs [51(77.3%) and 58(87.9%)], many household obligations [44(66.7%) and 58(87.9%)], and high technology expenses [42(63.6%) and 58(87.9%)]. Non-MAPATA respondents in addition have shown low prices for paddy 43(65.2%) to be an obstacle for adoption of rice technologies. These factors are in line with Kauzeni (1989) who argues that since agricultural production is carried out by a vast majority of smallholder farmers in Tanzania, emphasis should be given to rapidly increasing the productivity by provision of relevant inputs, institutional credits, subsidies, and appropriate technology that effectively reduce drudgery in all farmers' operations.

The respondents mentioned institutional factors also as among the factors which frustrated the adoption of improved rice technologies in the study area. Ranked according to the weight attached to each by both MAPATA and Non-MAPATA respondents interviewed the individual factors included inadequate credit facility [64(96.9%) and 60(90.9%)], unreliable stockists [62(93.9%) and 47(71.2%)], inadequate VEOs advice [60(90.9%) and 62(93.9%)], and unavailability of technologies [55(83.3%) and 62(93.9 %)] respectively.

Definitely, developing countries need financial institutions to act as intermediaries between the idle savings and idle human resources. Many farmers need finance for subsistence during certain season periods, and most villagers need finance before some farming innovations are adopted, for the purchase of say, improved seeds and tools. Under such

condition credit facilities should be tied up with the adoption of improved farming practices and innovations. The informal credit systems which many interviewed farmers were using in the study area were exploitative in nature, and thus they were further pauperising the smallholder farmers. This is because loans in kind and cash were provided by the well off farmers to be repaid in kind twice to thrice as much.

The Lack of stockists has resulted into the lack or shortage of agricultural inputs. The situation is made worse by the failure to harmonise the supply or ordering of agricultural inputs within the farming seasons.

Ecological factors seemed not to be a serious problem to MAPATA respondents [51(77.3%1)]. However, 33(50.0%) Non-MAPATA respondents, whose rice production was completely rain-fed, showed that it was one of the obstacles to the adoption of improved rice technologies.

All in all, currently it is clearly known that in order to increase agricultural production the farmers must adopt the recommended farming practices. Nevertheless, the practices are many and form a package, each having its role in increasing crop yields. Therefore, there is a need for the farmers to adopt the whole package for maximum rice yields. The participatory development and selection of improved technologies, which form the package prompt adoption as compared to the imposed packages, which normally are rejected by the farmers. Nevertheless, it is important to consider the obstacles to the adoption of improved agricultural technologies during the establishment of the packages.

In conclusion, it is accepted by the Kinyope community that unavailability of improved technologies, unreliable stockists, inadequate credit facility, and inadequate VEO advice are institutional factors obstructing adoption of the selected improved technical packages. The socio-economic factors preventing the adoption of improved rice technologies included many household obligations, inadequate money to buy inputs, high technology expenses, and unco-operative GDFs. Unfavourable weather condition was considered by MAPATA respondents as not a serious problem, however, Non-MAPATA viewed ecological factors as a serious problem contributing highly to the prevailing food insecurity in Kinyope Village.

In general the analysis shows that there was no overall statistical significant difference ($P>0.05$) between the MAPATA and Non-MAPATA respondents. However highly statistical significant differences ($**P\leq 0.05$) were observer in the individual items compared.

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

Table 21: MAPATA respondents' opinion on how the organisation facilitated or inhibited adoption of improved rice technologies and practices in frequencies (N=66)

Group facilitation /Inhibition	Nr.	%
Facilitation		
Proper management and fair distribution of water is enhanced	51	77.2
Conflicts over water use for irrigation minimised.	48	72.7
More participatory problem solving	41	62.1
More sharing of experience and information.	38	57.6
Farmers are more organised	21	31.8
Easy contact with extension services	14	21.2
Inhibition		
Experienced persistent low rice yields	12	18.2

Note: Respondent indicated more than one option

Table 21 shows the distribution of MAPATA respondents by how the organisations facilitated or prevented adoption of improved rice technologies and practices. The following were found: More than three quarters [51(77.2%)] of the respondents see that their organisations enhanced proper management and fair distribution of water (resource) for irrigation. This is in line with the System management theory (Roling, 1988) by which it is assumed that Farmers organisations have the following roles: Co-ordination of the timing and interactions of the mobilising, training and organisation of the resource providing components. MAPATA for the case of Kinyope Micro-Irrigation Project are responsible for the mobilisation of farmers for the construction of the weirs, distribution of water in the farms at the right time, and enabling interaction with other organisations.

More than two-third [48(72.7%)] of respondents regard the MAPATA organisations as minimising conflicts amongst water users, which used to occur in the past. Before the

formation of MAPATA there were reports of quarrel, which sometimes ended with fighting amongst the farmers. This is in line with the views by Roling (1988) that, farmers' organisations are mediators of conflicting interests amongst the members.

Fourty-one (62.1%) of the respondents consider the organisations as facilitating them to solve their problems in a more participatory way. Likewise, Kauzeni (1989) argues that, group meetings normally make problem solving possible through democratically discussion of community affairs. According to the author, the meetings provide an opportunity for a full expression of opinions and ensure democratic thinking and action because all actions decided upon become the action of the whole group. MAPATA meetings in the case of Kinyope Micro-Irrigation Project stimulate thinking and help in providing better solutions to problems as a result of pooled thinking of many people.

Thirty-eight (57.6%) of respondents considered the organisations as increasing sharing of experience and information amongst the members. Regarding this, Bebbington (1989), cited by Ramirez (1997), argues that farmers' organisations can actively adapt and disseminate agricultural technologies in programmes through meetings, which are the cheapest and most effective media of communication.

Moreover, 21(31.8%) of MAPATA respondents looked at the organisations as making them more organised and capable of lobbying to the authorities for more support. Successfully farmers' organisations are capable of making claims from below, thus leading to greater efficiency and effectiveness of the development machinery. Lastly, 14(21.2%) of respondents consider the organisations as facilitating easy contact with extension services.

Experience shows that in Kinyope, most of the development agents visiting the village pay more visits to MAPATA than to Non-MAPATA probably, as Kauzeni puts it, they make use of the advantage that they can meet with several individuals simultaneously, which saves time as well as resources.

Nevertheless, 12(18.2%) of respondents showed that in spite of being in the organisations, the farmers were still experiencing persistent low rice yields. The idea is supported by the findings in Table 16, which shows that more than 20(30.3%) of MAPATA respondents had rice yields ranging from 4 to 8 bags per acre, which is the lowest. Also in Table 15 results on the rating of rice yields 18(27.3%) of Non-MAPATA respondents indicated that there were no changes in rice yields in spite of adopting the package.

Generally, the central element in people's participation in programmes is the formation of viable stable farmers' groups as the first step in a long-term institutional building process (FAO, 1990). This is because working with farmers' organisations is a deliberate strategy to access a large number of clientele given the unavailability of resources. Therefore, MAPATA in the case of Kinyope Micro-Irrigation Project helps to unite and empower the smallholder farmers who are the loosers by providing them with the instrument for participation in local decision making, regarding the wise use of the available resources in their environment.

4.4.8 Perception of Non-MAPATA members towards MAPATA members

Farmers' organisations can help to build sustainable livelihoods for the rural poor in several ways. We have seen that they can act as a point of contact between research and extension worlds, and the livelihood conditions of the resource poor farmers. Besides that, it has been found that Fos can also actively adapt and disseminate agricultural technologies in programmes, which they themselves control and administer. Lastly, we have seen that Fos can act as users' constituency for the rural poor, pressuring public sector and non-governmental agricultural agencies to orient their work to needs of the poor.

Table 22: Non-MAPATA respondents' perception on the MAPATA members, in frequencies (N=66)

Differences	Nr.	%
High access to extension services	46	69.7
Experiencing improved living standards	22	33.3
Have improved household income	47	71.2
Have more recognition from the government and NGOs	28	42.4
Practice irrigation	55	83.3
Experiencing improved rice yields	59	89.4
Rice production can be carried out throughout the year	18	27.3
Reliable harvests	32	48.5
Enjoying high degree of togetherness	39	59.1

From the perspective of Non-MAPATA members, Table 22 shows that 46(69.7%) of the respondents understood the MAPATA members as having high access to extension services. More than two-thirds [47(71.2%)] considered the MAPATA members as experiencing improved household income, while 59(83.3%) viewed them as practicing traditional irrigation. In addition, 59(89.4%) felt that MAPATA members were experiencing improved rice yields, whereas 39(59.1%) regarded them as enjoying high degree of togetherness. Whereby 32(48.5%) perceived MAPATA members as experiencing

reliable harvests, 28(42.4%) viewed them as having more recognition from government and Non-Governmental Organisations (NGO). Concerning the importance of farmers' groups, Laizer (1999) observed that many successful countries to which agriculture is the main stay of the national economy, are mostly facilitated by the driving force coming from groups' activities. Hence, smallholder farmers should be encouraged to organise themselves into groups which can represent their interests and stimulate the national economic growth.

It is in this respect, that the Kinyope farmers are working toward forming the village level farmers' association by bringing together the 13 MAPATA institutions to form a village level network. The usefulness of these organisations goes beyond just ensuring active utiliser sub-systems. They can also provide other services like inputs, credit, marketing, processing, and other services along with technological information. Farmers' organisations may range from co-operatives for rice production, co-operatives for input provision, general farmers' associations, to rural women's associations and so forth.

4.4.9 Motivation of Non-MAPATA members for joining or for not joining MAPATA

Table 23: Non-MAPATA respondents opinions for joining MAPATA, in frequencies(N=66)

Motivation	Nr.	%
For Joining		
Irrigability of farmland	61	92.4.2
Improved rice yields per acre	45	68.2
Togetherness of MAPATA members in problem solving	42	63.6
High access to extension services	43	65.2
Reliable harvests	12	18.2
Proper management and equitable distribution of water	3	4.5
For not Joining		
Land shortage problem	49	74.2
High land rental charges	48	72.7
High land prices	7	10.6
No apparent reason	11	16.7
Conflict among water users	1	1.5

Note: Respondents indicated more than one option

From Non-MAPATA respondents' viewpoint, Table 23 indicates that 61(92.2%) of the respondents were encouraged to join the MAPATA by the irrigability of the farmland. Note that, the MAPATA institutions comprise of farmers who depend on water from the same intake (weir) for irrigation. So its members are essentially farmers who are also practising traditional irrigation. Furthermore, 45(68.2%) respondents were impressed by improved rice yields experienced amongst the MAPATA members due to the extra facilitation they were getting. Note that Table 22 indicates that MAPATA members had high access to extension services [46(69.7%)]. The same also has been confirmed by MAPATA respondents themselves in Table 21 [14(21.2%)] on how the organisations facilitated or inhibited adoption of improved rice technologies and practices. Besides that, 42(63.6%) of Non-MAPATA respondents admitted to have been motivated by the

togetherness of MAPATA members in problem solving. Group meetings normally stimulate thinking and help in providing better solutions to problems based on the pooled thinking of the majority of members, which the Non-MAPATA members on the other hand lacked.

Moreover, 43(65.2%) of Non-MAPATA respondents revealed to have been to a greater extent interested with the high access to extension services enjoyed by the MAPATA members. This confirms the easy contact with extension services for MAPATA members mentioned in Table 21 [14(21.2%)], as a facilitating factor to adoption of improved rice technologies and practices, and the recognition the MAPATA members were enjoying from both the government and NGOs Table 22 [28(42.4%)]. Furthermore, 12(18.2%) of Non-MAPATA respondents indicated that they were jealous of the reliability of rice harvests enjoyed by their colleagues in MAPATA who could complement the rainfall shortages with traditional irrigation.

However, 49(74.2%) and 48(72.7%) of Non-MAPATA respondents showed that they were scared by the land shortages and the associated high rental charges respectively, in MAPATA land. Those who would like to buy land in the MAPATA also were being frustrated by the high land prices [7(10.6%)], whereby an acre was being sold up-to Tshs. 100,000. Again it should be remembered that the MAPATA farmlands are found along the river plains and almost all of them were occupied since long time ago and ownership is passed over to the children of the same lineage. So, for newcomers, it is almost impossible to obtain permanent land ownership in the MAPATA, except on hire and purchase basis.

4.5. Attitude of key actors with respect to networking to address rice production constraints

4.5.1 General discussion

As it has already been pointed out, farmers usually derive information from several sources, including other farmers, traders, input suppliers, extension agents and formal research institutions. It has been also found that these different actors comprise agricultural communication networks and interact regularly in many ways to form new relationships for technology development, dissemination and adoption.

According to Haverkort *et al.* (1993), networking is a powerful and cost effective way of sharing information and achieving various other goals that an individual cannot achieve alone. This is because networking plays an important role in bringing about a more participatory approach to research, extension and agricultural development. Communication networks in agriculture are integral parts of the farming systems, and the most common instruments used in networking are workshops, seminars and exchange of visits.

During the networking process, the stakeholders interact constantly, seeking to negotiate and create opportunities to fulfil their needs and pursue their interests (Ramirez, 1997). The stakeholders as a social organisation, their joint actions either enhance or limit the development of innovations, transfer and adoption (Engel, 1994). The smallholder farmers in rural areas are constantly being challenged with multi-facet problems and constraints, which have to be solved through participatory innovation development. According to

Laizer (1999, the innovations constitute areas where farmers and other actors have to play different but complementary roles which must be clear in the process of innovation development, transfer and utilisation.

The traditional Transfer of Technology (ToT) model, which considers an innovation as a single uniform product that is generated by researchers and flows downstream to the farmers in a one-way linear process, has proved to be wrong. Smallholder farmers are neither depositories of technologies that are developed somewhere else nor passive consumers of such technologies, rather, they are active problem solvers who develop and transfer for themselves most of the technologies they are using.

Hence, the overlapping of the stakeholders whereby information and knowledge provide a common denominator among them is very important for agricultural development. The process makes the information and knowledge flow amongst research, extension organisations and farmers a two-way process. The two-way exchange of information as a result of networking facilitates the effective generation and transfer of relevant technology by allowing researchers, field workers and rural communities jointly to identify the networks of information exchange, and bring the actors together in a closer learning and planning process. It has been found that, direct links with farmers usually facilitate the development of relevant technologies by providing rapid feedback to research and establish strong links with extension for effective dissemination of verified technologies.

It was important in this study to find out whether the respondents were aware of the key actors whom they were interacting with. Note that key actors are the important

stakeholders in agriculture development in the study area as categorised in Table 24. They range from decision makers, policy makers and extension workers to researchers. This sub-section also considers the knowledge of the respondents regarding the initiators of the network, how frequent, the place where they used to meet and the purposes of meeting. These aspects constitute the core of discussion in this part of the study.

4.5.2 Knowledge of the respondents about the key actors

Table 24: Respondents opinions about the knowledge of key actors, in frequencies (n=132).

Key Actors	MAPATA respondents (N=66)		Non- MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
Member of Parliament (MP)	53	80.3	51	77.3
District Commissioner (DC)	22	33.3	17	25.8
District Agricultural and Livestock Officer (DALDO)	11	16.7	9	13.6
District Extension Officer (DEO)	15	22.7	9	13.6
Divisional Secretary (DS)	41	62.1	36	54.5
Project Manager (PM)*	45	68.2	44	66.7
Ward Councillor (WC)*	55	83.3	48	72.7
Extension Staff (ES)	54	81.8	45	68.2
Research Staff (RS)*	24	36.4	9	13.6
Chi-square (SPSS) 2.455	df. 8	Observed signif. 0.372		

Regarding the knowledge of key actors, Table 24 provides a picture of the extent to which the respondents recognised the other stakeholders in agricultural development. Four-fifth [53(80.3%)] and 51(77.3%) of MAPATA and Non-MAPATA respondents respectively had knowledge of the Member of the Parliament (MP) of their constituency. Of course the MP, being a political leader is close to his voters; however, the outcome seems to have been influenced by the national election, which had taken place a year before. Most of the respondents thus seemed to know their MP more in connection with aspects other than agricultural development (on political grounds). The Ward Councillor (WC) also was

among the well-known people whereby 55(83.3%) and 48(72.7%) of MAPATA and Non-MAPATA respondents, respectively, confirmed to know him. Nevertheless, besides the political grounds, his familiarity was also a result of the development agents' adherence to the participatory approach to rural development, which insists on the sticking to proper channels in networking and the empowerment of the local authorities as service providers to the rural community (figure 5). The same reflects the properly co-ordinated involvement of the community in the development planning process (RIPS, 2000). The majority of respondents [54(81.8%) and 45(68.2%)] from both MAPATA and Non-MAPATA respondents, respectively, also confirmed to know the Extension Staff (ES). However, by that time the village did not have an extension staff of its own; rather it was sharing with the other four villages the one stationed at the Ward headquarters who seemed to be not well known by the majority of the respondents. Thus the majority of respondents were mostly referring to the transferred staff and were not aware that there was a replacement. Fourty-five (68.2%) and 44(66.7%) of MAPATA and Non-MAPATA respondents, respectively, knew the Project Manager (PM), whereas 41(62.1%) and 36(54.5%) of both knew the Divisional Secretary (DS). However, they were more connecting him with other administrative issues rather than agricultural matters.

4.5.3 Initiators of contacts

Only rarely do participatory development activities arise from within the poor groups without any form of outside stimulus. That is because it requires a catalyst or change agent who can break the viscous circle of poverty (Wignaraja, 1984), cited by Burkey (1996). However, in order to facilitate the participation of the farmers in projects, it is

recommended that these extension agents should see themselves as working with, rather than working for farmers, and that the potential clients should be involved from the on-set of programme planning. It is also upheld that extension agents should listen more than talk, learn more than teach, and facilitate more than lead.

Table 25: Respondents' views on initiators of contacts by key actors (n=132)

Organisers	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
	Nr.	%	Nr.	%
RIPS Staff	1	1.5	0	0.0
MAPATA Chairperson	11	16.7	11	16.7
MAPATA Secretary	0	0.0	0	0.0
Divisional Secretary	0	0.0	0	0.0
Village Chairperson	38	57.5	39	59.1
Project Manager	13	19.6	12	18.3
Research Staff	0	0.0	1	1.5
Total	63	95.3	63	
Chi-square(SPSS)	2.053	df.4	signif. 0.726	
Anova (SPSS)	F = 0.108	df. 1	signif. 0.743	

a/N does not add to 132 due to missing data

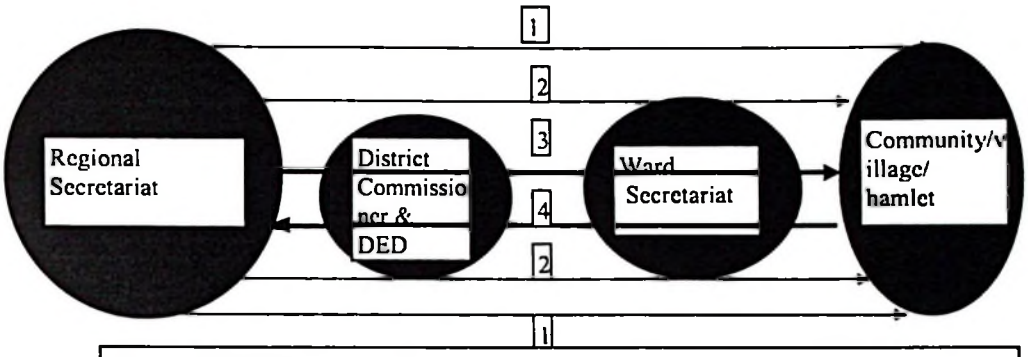
Table 25 presents outcomes on the initiators of contacts among stakeholders in Kinyope Micro-Irrigation Project. Thirty-eight (57.5%) and 39(59%) of MAPATA and Non-MAPATA respondents, respectively, indicated that the major initiator of contacts amongst key actors was the Village Chairperson. This is in line with the Tanzania Development Vision 2025 (URT, 2001), which emphasises on the creation of active and participatory civil society in the articulation of its needs and in taking pride to fulfil its societal responsibilities. The vision permits a greater role to the local actors to own and drive the process of their development, taking the advantage of the best knowledge of their problems, and thus being better placed to judge what they need, what is possible and how it can effectively be achieved. The policy aims at making the community responsible and

owners of development activities, which aim at improving their economic and social status. That, development agents in the district should not operate in isolation as it used to be in the past.

From experience, the regional government and development programme (donor agencies) staff used to go directly to the community, village or hamlet without contacting the district, division or ward authorities which resulted into contradictions and confusions during the implementation of instructions given (RIPS, 2000).

Likewise, the Rural Integrated Project Support (RIPS), which is a partner in Kinyope Micro-Irrigation Project, also emphasises on participatory approach to rural development. Under this system the regional government and/ or programme staff work jointly with the District and Ward authorities, to facilitate rural development. They sit together with the Village community and consider the opportunities and possibilities of collaboration, areas of collaboration, and community involvement approaches in alleviating problems according to priorities defined by the community itself. In such a case the village government plays a central role in the initiation and co-ordination of development agents' contacts with farmers (fig. 5).

Figure 5. Strengtherning of communication with the community



Source: RIPS 2000

Figure 5. Strengthening of communication with the community

KEY:

1. Govt staff/or dev. agent from regional secretariat goes directly to the Community /Village/Hamlet skipping the DC & DED and Ward level authorities. Gives instructions which result into confusions which later frustrate implementation (discouraged).
2. The regional level staff go to the community/village/hamlet with only one representative from one district department and give instructions on what should be done leaving the instructions with the DED (discouraged).
3. The regional level staff in collaboration with the District and Ward authorities go to the community, sit with the villagers, deliberate on the opportunities, and possible areas of collaboration, and the approaches to community involvement (encouraged).
4. The Source of Workplans is the community itself. The community identifies problems, defines the priorities basing on the experience, resources available, and ability. Any felt gaps to be filled by soliciting expertise, consultancy and resource contributions from Ward, District and regional levels where necessary (encouraged).

From Table 25 the Project Manager ranks second as the initiator of contacts as indicated by 13(19.7%) and 12(18.2%) of MAPATA and Non-MAPATA respondents, respectively. However, most of the respondents said that the process normally started in the village, which is an evidence that still the Village Authority was responsible. The 13 MAPATA Chairperson was also mentioned by both MAPATA and Non-MAPATA respondents [11(16.7%)], respectively, as the initiator of contacts. It is interesting here to note that both MAPATA and Non-MAPATA respondents recognised the MAPATA chairperson. This

reflects the total involvement of the community in major events regardless of whether they are members of the farmers' organisations or not. This is important because, according to Laizer (1999), all of them in different ways participate in the system of technology development and transfer, and thus need to be involved in all programme planning and evaluation stages.

However, there was no significant statistical difference (P>0.05) observed between the MAPATA and Non-MAPATA respondents. The reasons for this were, the important role played by the village government and the acceptability of the village Chairperson by the village community as a whole. Since the area was also being attended by the same VEO (that is the transferred one), there were evidences that he was covering both sides almost on equal basis. However, the following things are worthy mentioning:

- By then the village was being served by a VEO stationed at the Ward headquarters who also attended the other four (4) villages. However, according to the National Agricultural and Livestock extension policy and implementation guidelines (URT, 1995), the government states that each VEO will work with 800 to 1000 farm families where the cropping pattern is less intensive. The policy paper further states that, where the cropping pattern intensity is high, the VEO will work with 500 to 600 farm families. In addition to that, according to the Agricultural and Livestock Policy of Tanzania issued in 1997, agricultural extension services under the National Agricultural Extension Programme (NAEP II), the government targeted to have one VEO at the Ward serving 700 farm families. On contrary, it was observed that a VEO stationed in the Ward headquarters was attending more than 4,000 farmers in

more than five scattered villages. The reason for this situation given by extension staff and district heads contacted (DALDO, DEO, DPLO, etc.) was shortage of extension staff. The idea is supported by the DALDO's office reports, which show that Lindi district had only 23 VEOs stationed in 23 Wards providing service to 102 villages, thus making a VEO to Villages ratio 1: 4.4. (Appendix XII). Basing on these figures, obviously the area given to a VEO is beyond manageable levels. To ameliorate the effects of the shortage of extension staff, the Project Manager for Kinyope Project who stayed in town seemed to be performing most of the duties of a village extension staff.

Most of the extension staff interviewed in the project area also mentioned the shortage of logistical support to enable them to contact the more than 4,000 farmers in more than five villages under their control. The issue seems to be not well attended to by the Ministry of Agriculture and Food Security as stated in the Agricultural Extension Policy. The problem, to a greater extent, is frustrating the efforts of most extension staff to conduct regular visits to deliver information to the majority of farmers in the Ward. Given the poor transport facilities the extension staff are having (mainly broken bicycles and motorbikes), lack of money to buy fuel and spares parts, it becomes difficult for them to manage the areas properly. It has been also observed that sometimes the Ward and District councils use the VEOs for administrative purposes like executing the duties of Ward Executive Officers (WEOs) in their absence and participating in revenue collection exercises, which further defeat the efforts and schemes of those staff.

- To abridge the gaps caused by the shortage of extension services, increased use was being made of the few Trained Farmers (GDFs) available in the village (Tables 17 & 18), especially by the Non-MAPATA members 12(18.2%). In Kinyope these farmers were also used to train other farmers from both neighbouring and distant villages within and outside the district who had been impressed by the successes of the project package.

4.5.4 Places of contacts amongst key actors during the cropping season

The stakeholders' input in agricultural development ranges from awareness creation through discussion, reflection and questioning to the analysis together with the community. Thus the contacts are meant to facilitate the community to make agreement with the key actors and take action. To facilitate networking the extension staff are responsible for the encouragement of smallholder farmers to organise themselves into groups. They are also supposed to work with those groups in arranging formal, practical training in various aspects including group dynamics, simple bookkeeping, proposal writing, etc. The farmers' organisations need to be assisted and supported in arranging visits, to exchange information with other similar groups, projects, training and research centres and policy as well as decision makers.

The contacts usually aim at exposing the smallholder farmers to alternative ways of doing things, of organising and solving problems along with exposing them to alternative technologies and new ideas. Contacts with key actors likewise broaden smallholder farmers' horizons, enable them to see their own situation and problems in wider terms than

just their own locality. Under the new circumstances Ramirez (1997) suggests that the role of the extension staff should be that of information broker and problem solver rather than transferor of technology and conveyor of standard formulas.

Researchers and development agents currently are recommending the participation of smallholder farmers in the planning, implementation and financing of programmes so that in the future they can accomplish those processes on their own. However, conducive opportunities genuine to participation are required to influence sustainable participation and contacts among different partners in agriculture development. According to Laizer (1999), the challenge facing most extension programmes is to find out opportunities that combine the high level of participation with the infusion of the attitude of contact amongst key actors. Kinyope Micro-Irrigation Project attempted various opportunities and premises, namely demonstration on farms, MAPATA meetings, workshops, seminars, and farmers' field days to achieve the prior mentioned objectives.

Table 26: Respondents opinions on the frequency of contacts and places of contacts with government and party officials during cropping season in frequencies (n=132).

Key Actors/Respondents	Demonstration on farm		MAPATA meeting		Workshop or seminar		Farmers field days	
	Nr	%	Nr	%	Nr	%	Nr.	%
MAPATA respondents (N=66)								
MP	0	0.0	1	1.5	2	3.0	0	0.0
DC	0	0.0	0	0.0	0	0.0	0	0.0
DALDO	2	3.0	3	4.5	1	1.5	1	1.5
DEO	2	3.0	3	4.5	1	1.5	1	1.5
DS*	7	10.6	14	21.2	2	3.0	0	0.0
PM*	46	69.7	47	71.2	6	9.1	0	0.0
WC*	4	6.1	30	45.5	0	0.0	0	0.0
ES*	45	68.2	44	66.7	0	0.0	3	4.5
RS	26	39.4	14	21.2	0	0.0	7	10.6
Average	**14.7**	**22.3**	**18**	**27.3**	**1.3**	**2.0**	**1.3**	**2.0**
Non-MAPATA respondents (N=66)								
MP	0	0.0	0	0.0	2	3.0	0	0.0
DC	0	0.0	0	0.0	1	1.5	0	0.0
DALDO	0	0.0	1	1.5	1	1.5	0	0.0
DEO	0	0.0	1	1.5	1	1.5	0	0.0
DS*	1	1.5	3	4.5	3	4.5	7	10.6
PM*	28	42.4	27	40.9	2	3.0	9	13.6
WC*	3	4.5	5	7.6	5	7.6	8	12.1
ES*	27	40.9	22	33.3	2	3.0	11	16.7
RS	12	18.2	9	13.6	0	0.0	1	1.5
Average	**7.9**	**11.9**	**7.6**	**11.4**	**1.8**	**2.8**	**4**	**6.1**
Chi-square(SPSS)	**9.685**		**df. 24**	**observed signif. 0.28**				

** Observed statistical significance at 5% for a pair of compared items*
Note: Respondents indicated more than one option

Table 26 indicates that on average 18(23.7%) of MAPATA respondents contacted the key actors in MAPATA meetings. However, the majority of Non-MAPATA respondents on average [7.7(11.9%)] contacted the key actors on demonstration on farms. Demonstration on farm, on one hand, as a contact point with the key actors in Kinyope Village on average ranked second amongst the MAPATA respondents [14.7(22.3%)]. The MAPATA meetings on the other hand ranked second on average amongst the Non-MAPATA

respondents [7.6(11.4%)] as a place where frequent contacts with the key actors were made during the cropping seasons.

Again, it is noteworthy that both MAPATA and Non-MAPATA respondents used MAPATA meetings as contact centres. This indicates the involvement of the whole community in major events taking place in the village regardless of whether they are MAPATA members or not. The importance of this is that all the farmers participate in different ways in the system of technology development and transfer.

It should be also noted that most of Non-MAPATA respondents who mentioned MAPATA meetings as contact places were either those who in the previous season were MAPATA members or those who participated in the decision making process and in the construction of "PATA KUU" (the big weir).

Generally, it is at these points where various stakeholders in agricultural development were meeting to evaluate the results of using improved rice technologies and create awareness on their working relationships, which further motivated the development of more stronger ties. Therefore, there is a need in the future to workout means of developing greater capacity to form strong ties between research and extension institutions and among the rest of key actors in agriculture development.

The general difference between MAPATA and Non-MAPATA respondents was that the extension staff* spent more time amongst MAPATA than with the Non-MAPATA. For instance, demonstration on farm was mentioned as contact point with the extension staff by

45(68.2%) and 27(40.9%) of MAPATA and Non-MAPATA respondents respectively. MAPATA meetings were mentioned as contact places with the extension staff by 44(66.7%) and 22(33.3%) of MAPATA and Non-MAPATA respondents, respectively, making gaps of 18(27.3%) and 22(33.3%), respectively, which indicate a bias in favour of MAPATA members. Similarly the Project Manager* used demonstration on farms as contact places for MAPATA [46(69.7%)], whereas only 28(42.4%) of Non-MAPATA respondents mentioned it. The same applies to MAPATA meetings where by 47(71.2%) and 27(40.9%) of MAPATA and Non-MAPATA, respectively, considered it a place of contact with the PM. Again the gaps noticeable are 18(27.3%) and 20(30.3%), respectively, both in favour of MAPATA. Even the information concerning the researchers give the same direction and hence confirming the allegation that the MAPATA members were having higher access to extension services than Non-MAPATA members, Tables 21 and 22 refer.

The Chi-square analysis shows that there was no overall statistically significant ($P>0.05$) difference between the MAPATA and Non-MAPATA respondents. However highly significant* statistical differences (**$P\leq0.05$) were observer in the individual items compared.

4.5.5 Frequency of contact amongst key actors

Technology communication is a movement of knowledge to farmers in such a way that they act on it to achieve some useful results. The communication process consists of four essential elements, namely, the communicator, the message to be communicated, means of communication and the receiver of message (Kauzeni, 1989). It has already been found that

farmers derive information from many sources including other farmers, traders, input suppliers, outreach workers, formal research institutions and policy makers. Also we have seen that these actors form the agricultural communication networks in which they usually interact regularly in many ways to form innovations.

It has been found that, during the networking process information is exchanged in a two way system. In one hand technologies are generated by researchers and flow downstream to the farmers, while on the other hand farmers make use of the technology, confirm its relevance and provide rapid feedback to the researchers through extension.

However, Laizer (1999) observed that the premises, which would allow an effective retrieval and sharing of information between and among key actors, were not fully exploited in Tanzania to meet the information needs of resource-poor farmers. In spite of that, it is generally accepted that regular meetings with the key actors are the key strategies, which will likely initiate a dynamic process of constraints analysis and encourage smallholder farmers to express their own perceptions of constraints obstructing agricultural productivity.

Table 27: Respondents' views on the frequency of contacts with government and party officials in frequencies (n=132)

Key actors /Respondents	At least thrice a month		At least once a month		At most twice per season		Not at all	
	Nr	%	Nr.	%	Nr.	%	Nr.	%
MAPATA respondents (N=66)								
MP	0	0.0	0	0.0	25	37.9	41	62.1
DC	0	0.0	4	6.1	14	21.2	48	72.7
DALDO	0	0.0	4	6.1	12	18.2	50	75.7
DEO	2	3.0	3	4.5	14	21.2	47	71.1
DS	3	4.5	5	7.6	15	22.7	43	65.2
PM	47	71.2	4	6.1	4	6.1	11	16.7
WC	6	9.1	16	24.2	21	31.8	23	34.8
ES	22	33.3	15	22.7	13	19.6	16	24.2
RS	30	45.5	3	4.5	0	0.0	33	50.0
Non-MAPATA respondents(N=66)								
MP	0	0.0	0	0.0	30	45.5	36	54.5
DC	0	0.0	1	1.5	15	22.7	50	75.8
DALDO	1	1.5	1	1.5	12	18.2	52	78.8
DEO	0	0.0	1	1.5	16	24.2	49	74.2
DS	1	1.5	2	3.0	20	30.3	43	65.2
PM	21	31.8	4	6.1	14	21.2	27	40.9
WC	5	7.6	7	10.6	18	27.3	41	62.1
ES	17	25.7	9	13.6	16	24.2	22	33.3
RS	15	22.7	3	4.5	3	4.5	45	68.2

Note: Respondents indicated more than one option

Table 27 presents the frequencies of contacts amongst the key actors to address rice production constraints by the respondents of both MAPATA and Non-MAPATA, respectively. From the Table the majority of MAPATA 47 (71.2%) respondents met with the Project Manager, 30(45.5%) with the Research Staff, and 22 (33.3%) with Extension Staff at least thrice a month. This is contrary to Non-MAPATA respondents whereby the majority of respondents 21 (31.8) contacted in the same frequency the Project Manager, 15(22.7%) the Research Staff, and 17(25.7%) the Extension Staff. These established gaps between MAPATA and Non-MAPATA respondents of 26(39.4%), 15(22.7%) and 5(7.5%), respectively, which indicate the trend of contacts to be in favour of the MAPATA members.

Similarly, the majority of MAPATA respondents 16(24.2%) contacted the Ward Councillor, 15(22.7%) contacted the Extension Staff at least once a month, whereas very few Non-MAPATA respondents 7(10.6%) and 9(13.6%) only contacted the Ward Councillor and Extension Staff, respectively. It is noteworthy that there was a closer contact relationship between the key actors and MAPATA than with the Non-MAPATA respondents.

However, the majority of MAPATA respondents 25(37.8%) contacted the Member of Parliament, 21(31.8%) contacted the Ward Councillor, and 15(22.7%) met with the Divisional Secretary at most twice per season. Similarly, the majority of Non-MAPATA respondents 30(45.5%) contacted the MP, 18(27.3%) contacted the Ward Councillor, and 20(30.3%) met with the Divisional Secretary at most twice per season. Regarding this, the gaps recorded were -5(-7.6%), 3(4.5%) and -5(-7.6%), respectively, which do not indicate a significant statistical difference between the MAPATA and Non-MAPATA respondents.

The analysis shows that there is an overall significant statistical difference in the frequency of contacts among the key actors between MAPATA and Non-MAPATA respondents. This was contributed by the key actors favouring mostly working with the MAPATA than the Non-MAPATA members as it is reflected by the noted contact gaps which show that the frequencies of contacts were higher with the MAPATA. However, the multitude of projects previously implemented, and the Kinyope Community integrity facilitated the cross sharing of experience between the MAPATA and Non-MAPATA members. Also the lack of permanent land ownership amongst the MAPATA constantly led dropouts who

became Non-MAPATA but equipped with experiences, innovations and practices from MAPATA. The findings have revealed that the higher the interlinkage amongst the stakeholders in agricultural development the higher the frequency of contact.

4.5.6 Purpose and usefulness of the contacts among key actors

4.5.6.1 Purpose of contacts

The following have already been established regarding contacts among key actors: the knowledge of respondents on the key actors, premises of contacts, and the frequency of contacts among the key actors in agricultural development. Consideration is now made on what were the purposes of contacting the key actors. With respect to this, Laizer (1999) observed that most smallholder farmers, members and non-members of participatory farmers groups were contacting various key actors mainly for the purposes of learning on the improved rice technologies, verifying the potentials of using improved rice technologies, discussing on rice marketing and selection of improved rice technologies.

Table 28: Distribution of respondents by purpose of contacting the key actors (n=132)

	To discuss on marketing problems		To learn on improved rice technologies		To select improved rice technologies		To plan for the cropping season		To discuss on agric inputs		To verify the potential of using improved rice technologies	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr..	%	Nr.	%
MAPATA respondents (N=66)												
MP	0	0.0	0	0.0	0	0.0	5	7.6	0	0.0	0	0.0
DC	0	0.0	0	0.0	0	0.0	7	10.6	0	0.0	0	0.0
DALDO	0	0.0	3	4.5	2	3.0	9	13.6	0	0.0	2	3.0
DEO	0	0.0	6	9.1	6	9.1	13	19.6	0	0.0	3	4.5
DS	0	0.0	1	1.5	1	1.5	21	31.8	0	0.0	0	0.0
PM	0	0.0	50	75.8	49	74.2	23	34.8	0	0.0	47	71.2
WC	0	0.0	7	10.6	7	10.6	24	36.4	0	0.0	4	6.1
ES	0	0.0	54	81.8	45	68.2	23	34.8	0	0.0	46	69.7
RS	0	0.0	31	47.0	27	40.9	5	7.6	0	0.0	29	43.9
Non-MAPATA respondents(N=66)												
MP	0	0.0	0	0.0	0	0.0	5	7.6	0	0.0	0	0.0
DC	0	0.0	0	0.0	0	0.0	9	13.6	1	1.5	1	1.5
DALDO	0	0.0	0	0.0	1	1.5	7	10.6	0	0.0	1	1.5
DEO	0	0.0	6	9.1	5	7.5	5	7.6	0	0.0	3	4.5
DS	0	0.0	4	6.1	5	7.5	11	16.7	0	0.0	2	3.0
PM	0	0.0	32	48.5	33	50.0	22	33.3	0	0.0	31	47.0
WC	0	0.0	14	21.2	14	21.2	26	39.4	0	0.0	13	19.7
ES	0	0.0	20	30.3	17	25.8	19	28.8	0	0.0	32	48.5
RS	0	0.0	19	28.8	16	24.2	8	12.1	0	0.0	16	24.2

Note: Respondents indicated more than one option

Table 28 presents the results on the purpose of contacting the key actors by the MAPATA and Non-MAPATA respondents in Kinyope Micro-Irrigation Project. The majority of MAPATA respondents 50(75.8%) contacted the Project Manager, and the Extension Staff 54(81.8%) to learn on improved rice technologies. Likewise, 32(48.5%) and 20(30.3%) of Non-MAPATA respondents also contacted the Project Manager and Extension Staff, respectively, for learning on improved rice technologies. Eighteen (27.3%) and 34(52.0%) gaps, respectively, were recorded, indicating that the MAPATA respondents were closer to the Project Manager and Extension Staff.

Besides that, the majority of MAPATA respondents 47(71.2%) and 46(69.7%) and Non-MAPATA respondents 31(47.0%) and 32(48.5%)) contacted the Project Manager and Extension Staff, respectively, for the purpose of verifying the potentials of using improved rice technologies. Again it can be noted that there were gaps of 16(24.2%) and 14(21.2%), respectively, in favour of MAPATA respondents, hence re-emphasising the allegation that the Project Manager and Extension Staff were more accessible by MAPATA than by Non-MAPATA members (Tables 21, 22 and 23).

Similarly, the majority of MAPATA and Non-MAPATA respondents contacted the Research Staff for the purpose of learning on improved rice technologies 31(47.0%) and 19(28.8%)), and verifying the potentials of using improved rice technologies 29(43.9%) and 16(24.2%), respectively. Gaps were also noted and the general trend was also more or less inclined towards the MAPATA respondents.

Most of the policy makers, decision makers, and politicians (MP, DC, DS and WC) were contacted by both MAPATA and Non-MAPATA respondents for the purpose of planning for the new cropping Season. For Instance, Ward councillor (WC) scored 24(36.3%) and 26(39.4%) of both MAPATA and Non-MAPATA respondents respectively, whereas the Divisional Secretary (DS) ranked second by being contacted by 21(31.8%) and 11(16.7%) of MAPATA and Non-MAPATA respondents respectively. On one hand the District Commissioner (DC) ranked third by being contacted by 7(10.6%) of the MAPATA respondents as well as 9(13.6%) of Non-MAPATA respondents, while on the other the same was contacted by 5(7.5%) of MAPATA and Non MAPATA respectively. In a period of about a decade the planning for the new cropping season, which takes place annually,

normally has been involving the whole village community, and entails mobilisation of farmers to increase agricultural production in the next season. That is why even the frequencies of contacts between MAPATA and Non-MAPATA respondents were approximately similar. Also the proximity of the WC and DS to the farmers as indicated by the high frequencies of contacts is due to the fact that the Ward is their operational area and hence events other than agricultural activities also facilitate contacts with the farmers.

However, it is noteworthy that most of the political and government leaders (MP, DC, WC, and DS) who were among the most known key actors (Table 24), were the least contacted by both MAPATA and Non-MAPATA respondents. This is an indication that they were known reasonably on grounds other than agricultural and mainly on political campaign meetings for 2000 National Elections grounds, etc.

Table 28 results also reveal that rice marketing and input supply were not serious problems, as no body from both MAPATA and Non-MAPATA respondents had contacted the key actors for that purpose. This is in line with the results in Tables 19 and 20 which disagree with the reservation that rice marketing was among the factors that prevented the adoption of improved rice technologies.

The statistical analysis reveals a significant statistical difference between MAPATA and Non-MAPATA respondents on meeting for the purpose of learning and selecting improved rice technologies and verifying the potential of using improved rice technologies and practices.

The discussion on the rice marketing, agricultural inputs and planning for the new cropping seasons according to Table 28 data, do not indicate any significant statistical difference between the MAPATA and Non-MAPATA respondents.

In conclusion, it can be said that the slight variation in the setting up of linkages and contacts among key actors, between MAPATA and Non-MAPATA respondents noted in Table 28, can be attributed to the organisational differences existing. MAPATA respondents being organised into MAPATA institutions, which played a crucial role in the setting up of linkages and contacts among key actors, while on the contrary the Non-MAPATA respondents were not. Table 21 for instance, indicates that the institutions made contacts with the extension services easy, while Table 22, on the perception of MAPATA members by Non-MAPATA respondents shows that the MAPATA members were having high access to extension services.

4.5.6.2 Usefulness of contacts

Table 29: Distribution of MAPATA and Non- MAPATA respondents by rating of the usefulness of working with the key actors (n=132).

Usefulness of working with	MAPATA respondents (N=66)		Non-MAPATA respondents (N=66)	
Key actor	Nr.	%	Nr.	%
Very useful	65	98.5	62	93.9
Less useful	1	1.5	1	1.5
Not useful	0	0	3	4.5
TOTAL	**66**	**100**	**66**	**100**
Chi-square (SPSS)	**3.071**	**df.2**	**Observed signif.**	**0.215**

Keregero (1981), cited by Laizer (1999) in a study seeking to identify critical requirements for the job of extension worker in Tanzania found that contacts with clientele were critical and that face-to-face interaction should be the primary means of communication. Table 29 presents the results on the usefulness of contacting the various actors in technology development, transfer and adoption. The majority of both MAPATA 65(98.5%) and Non-MAPATA 62(93.9%) respondents found networking with key actors to be very useful. The MAPATA respondents said that the contacts facilitated the exchange of information and experiences with the key actors. The contacts also were viewed as establishing the forum for the stakeholders in agricultural development to learn from each other. The understanding of each other of the stakeholders was perceived as creating opportunities for them to identify problems and collaborate in working out solutions. The working with the key actors was also considered as providing chances for them to support the farmers morally and financially. Some of the MAPATA respondents viewed the contacts as enhancing participatory problem solving based on the priorities as defined by the community itself. Also they mentioned the acquisition of skills and improved rice technologies as the other benefits obtained from their networking with the key actors.

The majority of Non-MAPATA respondents mentioned increased access to extension services as the most important and direct benefit accrued from contacting the key actors. Also they viewed the contacts as facilitating the key actors to understand the farmers' problems. On the other hand the farmers considered the contacts as establishing forums for exchange of information and experiences with the key actors. Moreover, the contacts were seen in the light of enabling the rural community to understand the government, donors and NGOs' arrangements concerning agricultural development. In addition, the contacts were

viewed as playing a key role in sensitising the adoption of improved rice technologies and creation of premises to jointly participate in problem solving with other stakeholders.

However on one hand, 1(1.5%) of MAPATA respondents interviewed considered the contacts as less useful due to the tendency of the key actors of mixing executive issues with politics, which he said turned them into liars. The respondent mentioned the bureaucratic tendencies of some of the key actors as contributing to them attaching less value to the rural community problems. On the other hand 3(4.5%) of Non-MAPATA respondents viewed the contacts to have not been useful because most of the ideas delivered to the farmers had proved to be not helpful. They cited the persistent low rice yields experienced by MAPATA members in spite of adopting the recommended improved rice technology package as shown in Table 21.

It is important to note here that both MAPATA and Non-MAPATA respondents admit that exchange of information and experience, learning from each other, identification of problems and collaboration in working out solutions, enhancing participatory problem solving, which is based on the priorities as defined by the community itself and acquisition of skills and improved rice technologies as among the benefits obtained from their networking with the key actors. Kinyope Micro-Irrigation Project is thus a challenge to other extension programmes, which apply the linear approach to farmers' needs and aspirations.

In linear model, the generation, transfer and utilisation of technologies are in sequence and lack feedback loops. There is a clear division of labour and no synergy (Epnou, 1996),

cited by Laizer(1999). Under the linear model research generates technologies, extension transfers to farmers and farmers use the technologies. There is no collective responsibility for the outcome of a joint effort and researchers do not see the generation of practical knowledge as the required output of their efforts. In most cases this has dwindled the smooth flow of agricultural technologies responsive to the needs and production conditions of resource-poor farmers in the developing countries in spite of the considerable investments in research and extension services.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Overview

In view of the findings, and discussions from the respective sections of the study in the previous chapter, some basic conclusions and recommendations can be drawn concerning the contribution of Kinyope Micro-Irrigation Project participatory approach in the increased smallholder rice farmers' adoption of improved rice technologies and practices for increased yields in Milola Division in Lindi District, Lindi Region.

5.2 Major conclusions

The following conclusion can made basing on respective specific objectives of the study:

5.2.1 The effects of socio-economic and demographic variables on participation

1. Socio-economic and demographic factors affect participation of target groups in development projects in the study area. This has been reflected by; First, the poor participation of youths (18 - 25 years old), gender imbalances (females are only 29(43.9%) and 23(34.8%) for MAPATA and Non-MAPATA respectively) and the excessive dependency on family labour. Second, the high literacy level together with the associated high level of participation and the smallness of farm sizes coupled with their scatter. Third, men were more active in participation in development projects and programmes than women. Fourth, marriage promoted the participation of the couples in development projects in the study are because of the

complementarity of labour roles and the over-dependence on family labour. Fifth, the small number of trained farmers recorded, which usually results into low levels of adoption of improved technologies.

2. There were no significant statistical differences ($P>0.05$) observed between MAPATA and Non-MAPATA respondents in terms of personnel characteristics. However significant differences ($*P\leq0.05$) were observed in farm characteristics and specifically in main food crops, farm size under rice and in the types of courses attended.

3. The majority of smallholder farmers in rural areas in the study area are mostly between the age of 26 and 50 years and own farm sizes between 0.5 and 6 acres.

4. In order to have effective, efficient and sustainable extension programmes a research on the potentials, opportunities and constraints of the target groups is important. For instance, the high literacy level of the smallholder farmers and the existing production potentials of Lukuledi, Milola, and Mbwemkulu valleys are some of the opportunities worthy exploiting. The poor involvement of youths (18 to 25 years old), gender imbalances, excessive dependence on family labour, small farm sizes and the relative small number of trained farmers, are some of the main constraints to be worked on.

5.2.2 The selected improved rice technologies and practices adopted

1. Very few technologies and practices were adopted. The adopted technologies and practices were proper seedbed preparation technology, and bunds construction technology only.

2. Access to many sources of information is crucial to ensure higher degree of transfer and adoption of improved agricultural technologies by smallholder farmers. However proper co-ordination of the sources and the information flow to the farmers at all levels is required to realise the expected outcome of adoption in crop production.

3. The participation of smallholder farmers in the development of the technical packages, and the delivery of the technologies in package form promote even dissemination and adoption.

4. The characteristics of improved rice technologies and comparative advantages such as the consistence of the new technologies with the past ones, simplicity, triability, and the observability of the technologies, play a crucial role in different levels of adoption and rejection of the selected technical packages. The reasons for rejection generally range from the complexity of the new technologies (laborious), lack of triability and the superiority of the new technologies over the previous ones. The extension programmes and development agents should pay a special attention to these characteristics together with the others to ensure increased adoption of the selected technical packages.

5.2.3 The effects of the adoption on increased rice yields

1. Generally a slight increase in rice yields for both MAPATA and Non-MAPATA respondents were noted. However, significant statistical differences in the adoption (*P≤0.05) of improved rice technologies, and yields (*P≤0.05) in favour of MAPATA respondents were also observed. This was due to the flow of improved rice technologies and practices, which had a bias in favour of MAPATA respondents. The noted increase in the adoption of improved rice technologies and yields is attributed to Micro-Irrigation Project participatory approach used by extension agents and MAPATA members to speed-up transfer of improved rice technologies. Extension services should therefore put more emphasis on the use of participatory approach to promote diffusion and utilisation of improved agricultural technologies. Moreover, the GDFs played the consultant's role in the dissemination and adoption of the rice technologies mostly amongst the Non-MAPATA to complement the efforts of the less accessible VEO. However, the institutional, socio-economic and ecological factors played an important role in retarding the transfer and adoption of improved technologies and practices

2. More participatory problem solving, easy contacts with extension services and more sharing of experiences and information amongst farmers are basic in stimulation and promotion of farmers' participation in the dissemination and adoption of improved rice technologies and practices. It is important for agricultural extension programmes to consider these factors to enhance clientele participation at different stages in extension programmes

3. MAPATA meetings, on-farm demonstrations, farm visits, and home visits were some of the participatory approaches used by Kinyope Micro-Irrigation Project. The increased recognition of MAPATA institutions by both the government and NGOs and the high degree of togetherness experienced by the MAPATA members, were the important factors in promoting increased adoption of improved rice technologies. Participatory approach, which is based on collaborative, and consultative modes of participation, has the potentials of complementing the conventional extension approaches, which are more or less contractual. The approach promotes the sense of interaction among the stakeholders in agricultural development by formulation of mutual objectives and total engagement to shared goals.

5.2.4 The attitude of key actors regarding networking

1. Out of the nine key actors who had contacts with smallholder farmers the Project Manager, extension staff, Ward Councillor and researchers were the most known. This suggests that the 3 key actors were closer to farmers than the others.

2. MAPATA meetings and demonstrations on farm were the main points for the Project Managers, agricultural extension and research staff to learn on improved rice technologies, select improved rice technologies and verify the potential of using improved rice technologies.

3. Farmers' Organisations facilitate the setting up of strong and effective linkages and contacts among the stakeholders in agricultural development. This is found useful

because they promote acquisition of skills, and improved production technologies, joint identification of problems and participatory problem solving based on the priorities as defined by the community itself.

4. Kinyope being a focal point for researchers, development agents and farmers from within the region, the country and outside countries, needs a professional staff stationed and operating from within the village. It is true that GDFs play important roles in dissemination of technologies amongst the farmers and provision of orientation to the visitors, however, they are very few, and need to be supervised.

5.3 Recommendations

In the light of the above conclusions, the following recommendations are made, which might be useful to development planners, policy makers, and development agencies working with the rural communities.

1. For successful active participation of smallholder farmers in development programmes and projects working with smallholder farmers, a focus should be on farmers within the age range of 26 to 50 years, which is the most active segment of rural population.

2. The smallholder farmers should participate in the planning, implementation and financing of programmes so that in the future they can accomplish those processes on their own.

3. In order to ensure that the selected technical bundles meet the specific needs of a particular clientele at its respective localities, it is important that all the attributes of the innovations are carefully taken care of by both the extension staff, research staff and the farmers during the selection, dissemination and adoption. The package should be economically viable and should take account of risks.

4. Piece-meal adoption of technologies renders it impossible for the farmers to realise meaningfully the expected results of the package. In most cases this has been the reason for the reported persistent low yields experienced amongst the farmers who have been adopting the technical packages only partially. Therefore, it is recommended that the farmers should adopt the bundle of innovations as a whole rather than piece-meals so as to obtain the expected outcome. Since the application of the whole bundle of innovations is a pre-requisite for high returns per acre and per hour of work, the extension officer should recommend to the farmers the complete packages of innovations.

5. Researchers and extension staff should consider the institutional, socio-economic and ecological factors of the beneficiaries before involving them in development programmes and projects. Other key factors specific to the projects' environments also should be considered in the establishment/or selection of improved agricultural innovations and practices to make sure that the packages are technically sound, economically feasible, culturally compatible and educationally attainable in the context of the smallholder farmers.

6. The day-to-day survival is a full-time occupation of the smallholder farmers. Most of them are poor, isolated, and often dependent on informal moneylenders. The isolation usually excludes them from the decision making process, leaving them without a say in their future. It is therefore recommended that the participation of smallholder farmers in development projects should go together with the establishment of savings and credit systems. That can break the isolation and increase the potentials of participation by arresting dependence on high cost money supplies. That should also open up credit lines and teach people how to manage money for the creation of income generating activities and saving for the future. That can be achieved by the projects having components for promotion of savings and credit systems for rural families. However, those systems should be tailored not only to provide credits to the individual farmers with assets or to those who are able to pay down payments and collateral as the case is with most of the formal financial institutions, but also to all those engaged in farming. For instance for the case of Kinyope, the PATA-KUU being a local network of MAPATA, should consider providing also other services like savings and credit, input supply, etc. It is noteworthy that community capitalisation and management of financial service associations make the members feel themselves as owners, and hence facilitating the repayment since the borrowers will consider un-repayment of their loans as damaging their neighbours and relatives.

7. The extension service should work towards promoting the formation and consolidation of MAPATA/or participatory farmers' organisations to facilitate networking amongst the key actors in agricultural development. The Kinyope

Micro-Irrigation Project for example, could reach more smallholder farmers than most of the previous programmes because it used participatory MAPATA meetings as a major means of contact with and among the smallholder farmers and key actors. The participatory extension approach applied by MAPATA provided opportunities for the farmers, extension staff, researchers, and key actors to learn together and build up the technical bundles relevant to the farmers' needs.

8. According to the Agricultural and Livestock Policy of Tanzania issued in 1997, agricultural extension services under the National Agricultural Extension Programme (NAEP II), targeted to have one village extension officer at the Ward, serving 700 farm families. However, currently the VEO at the Ward headquarters serves more than 4,000 farm families. The large size of the operational areas coupled with inadequate logistical support and poor motivation have greatly minimised the farmers' access to extension services. Given this situation the following alternatives are recommended;

- The target currently should be to have at least an extension worker for each 1 to 3 villages instead of the present situation whereby a VEO attends up to six villages.

- Given the inadequacy of resources which has under-capacitated the employment capability of the government, the Ministry of Agriculture and Food Security should workout a strategy to enable each village government to develop a technical package of its own, select a villager, and train him/or her on the various aspects of the village package. As far as payment is concerned, he/she may be volunteering

paid some honorarium fixed by the village according to how they value the service offered. Alternatively, each village should have special agreements with the individuals on the payment packages on the context of the financial and economic position of the respective villages. The staff should be the assistant/or auxiliary to the Ward Extension Officer (Appendix XV). Since he/she will be from the same village, he/she will be more committed, more acceptable by his/her fellow farmers and hence more accessible, and accountable to the village government. The auxiliary extension staff should be properly linked to the VEO at the Ward.

- Alternatively, the government, NGOs, and the village governments should establish contact farmers (GDFs), properly trained to meet the requirements of the technical bundles of the respective villages. Also they should sensitise the smallholder farmers to make contacts with the GDFs on demand. The VEOs should empower the GDFs and build confidence amongst the farmers to value their services. However, for more technical advice, the VEOs should visit the GDFs as well as the farmers themselves whenever possible. It is high time for the farmers to build habits of demanding the services from the providers instead of waiting for the Ward extension staff to visit them, which due to the prevailing shortages, has proved to be impossible. To create more training opportunities to GDFs and other smallholder farmers at the grassroots level, and narrow the observed farmers training gap, village-based training is recommended.

9. With regard to the privatisation or commercialisation of extension services as per the Medium Term and Strategic Plan (2000-2004-Draft) issued by the Ministry of Agriculture and Food Security, which goes together with the devolution of the

provision of extension services to local authorities, it is recommended that environment should be prepared to facilitate this to function. The kind of environment required is that in which the individual smallholder farmers are able to demand for the service from the providers and the ability to pay for it. This requires to the greater extent awareness creation, sensitisation, conscientisation and education of the farmers on the importance of the service of extension workers and the technical innovations given. This also will help to arrest the present tendency whereby the farmers wait to be visited by the extension worker, which given their acute shortage prevailing, has been difficult. In short the visiting of the extension worker by the farmers on demand basis should be enhanced for the provision of extension services by the private sector as well as the local authorities to succeed.

10. However, under the present environment whereby trade liberalisation policies are being pursued, farmers should unite into strong co-operative societies or associations, which will pool their resources, solicit resources from various other sources, and re-channel them back to the farmers, at a fair repayment rate in cash or in kind during the harvests. The Coast, Morogoro, and Dodoma Regions farmers' SACCOS is a preferable example of a local network for that purpose. To achieve this, farmers especially in Kinyope should strengthen the MAPATA institutions by ensuring membership stability, and strengthening the PATA KUU so that later it evolves into a strong farmers' co-operative society. This should go together with the strengthening of the use of participatory approach in their daily operations. Participation as a process should be a permanent feature of rural development and

an intrinsic part, which grows and strengthens as the projects develop, lasting the life of the projects into a permanent dynamic involvement.

11. The Ministry of Agriculture and Food Security should provide adequate support and training to extension workers. The provision of reliable transport and attractive salaries and fringe benefits are desired to motivate the desperate extension staff to work hard with the farmers. The innovative training will also enable the extension staff to face the challenges posed by the complex nature of the farmers' problems and obtain increased critical reflection and communication skills to facilitate the diffusion of technology and practice.

5.4 Suggestion for further research

This study has not exhausted all aspects concerning the role of participatory approach in development projects and programmes. It is clear that a lot more work needs to be done. Therefore, it is suggested that similar case studies should be undertaken in several other districts in Tanzania. The major purpose should be to explore the extent, relevance and usefulness of participatory approach in the planning, monitoring and evaluation of development projects and programmes in Tanzania.

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APPENDICES

APPENDIX 1: INTERVIEW SCHEDULE FOR MAPATA MEMBERS IN KINYOPE

THE ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN LINDI REGION: THE CASE OF KINYOPE MICRO-IRRIGATION MILOLA, MINGOYO AND MTAMA DIVISIONS LINDI RURAL DISTRICT.

1.0 INTERVIEW SCHEDULE FOR MAPATA MEMBERS IN KINYOPE.

(a) Date of interview
(b) Name of respondent.....
(c) Name of farmers organisation.....
(d)Name of the village.....
(e)Number of respondents.....
(f)Name of interviewer.....

2.0 INTRODUCTION

The purpose of this study is to examine the extent to which Kinyope Micro-Irrigation Project participatory approaches have contributed towards increased rice production through the dissemination of selected improved rice technologies and practices, facilitating on farm research by the farmers, training of farmers to up-grade their knowledge on rice production, facilitation of farmers to manage water use in their farms, and facilitation of Youths and Women to create awareness on land ownership and formation of water users associations and the strengthening of the present associations, in the district. You being a PATA member among the farmers and consolidated MAPATA in the project, you have been specifically selected to provide us with information about rice production and the approaches as used in Kinyope Micro- Irrigation Project. 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 co-operation with regard to this exercise. The information obtained from you will be strictly confidential.

3.0 SOCIAL DEMOGRAPHIC INFORMATION OF MAPATA 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 you 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)

(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 acre
(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 the 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 course held ?
(1) (.....) Diocese Hall in Lindi town
(2) (.....) Lindi District Council Hall
(3)(.....) Rutamba Community Development College Conference Hall
(4) (.....) Milola Godown
(5) (.....) others (specify).....

4.0 SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT THE MAPATA MEMBERS HAVE ADOPTED IN KINYOPE MICRO-IRRIGATION PROJECT.

(a) Have you heard of improved 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 technologies or practices	Yes (i)	No (ii)	Sources (iii)				
			Agric. Dpt (1)	RIPS (2)	Own (3)	NARLEP (4)	Others (5)
1.Proper seedbed preparation	.....	.....	.....	.....	.....	.....	.....
2.Use of HYV TXD 85 or 88	.....	.....	.....	.....	.....	.....	.....
3.Row planting of rice (20 x 20cm)	.....	.....	.....	.....	.....	.....	.....
4.Use of graduated wooden row space	.....	.....	.....	.....	.....	.....	.....
5.Construction of bunds	.....	.....	.....	.....	.....	.....	.....
6.Use of manila strings	.....	.....	.....	... ...	.....	.....	.....
7.Split application of fertilisers	.....	.....	.....	.....	.....	.....	.....
8. Use of sickle for paddy harvesting	.....	.....	.....	.....	.....	.....	.....
9.Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....

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

Improved rice technologies or practices	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 seedbed preparation	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Use of HYV TXD or 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice (20 x 20)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Use of wooden row space markers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5.Construction of bunds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6. Use of manila strings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7. Split application of fertilisers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9. Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

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

Improved rice technologies or practices	Previous technology or practice is better		Technology or practice is consistent 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 seedbed preparation	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Use of HYV TXD or 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice (20 x 20)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Use of wooden row space markers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5.Construction of bunds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6. Use of manila strings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7. Split application of fertilisers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9.Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

5..0 EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG MAPATA MEMBERS DUE TO KINYOPE MICRO-IRRIGATION PROJECT'S PARTICIPATORY APPROACHES IN THE PROJECT AREA.

(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 month
(4) (.....) we visit VEO on need basis
(5) (.....) no visit at all

e) Which of the following approaches do the extension agent 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 nioth (i)	At least once a month (ii)	At most twice per season (iii)	Not at all (iv)
1.MAPATA meetings	.....	.....	.....	.....
2. Field demonstration	.....	.....	.....	.....
3. Workshops/ seminars	.....	.....	.....	.....
4. Field days	.....	.....	.....	.....
5.Trained demonstration farmers	.....	.....	.....	.....
6.Farm visits	.....	.....	.....	.....
7.Home visits	.....	.....	.....	.....
8.Leaflets	.....	.....	.....	.....

(f) From your experience with the 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 yields per acre in your farm since Kinyope Micro-Irrigation Project 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 practising in selection and adoption of Kinyope Micro-Irrigation project 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.In adequate labour to effectively apply the technologies / practices	.....	.....	.....
3.Other obligations that compete for the recommended technologies/practices	.....	.....	.....
4.Recommended technologies or practices are too expensive	.....	.....	.....
5.Recommended technologies or practices are not available	.....	.....	.....
6.Recommended technologies or practices do not improve rice production	.....	.....	.....
7.Lack of market 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 advise from VEO	.....	.....	.....
13.Unfavourable weather condition	.....	.....	.....
14. GDF not co-operative	.....	.....	.....
15. Inadequate tractors to plough the fields	.....	.....	.....

(k) Have group(s) facilitated you in overcoming some of the above factors mentioned in (5j) ?
(1) (.....) yes
(2) (.....) no

(l) If the answer is *Yes/No* in (5k) above how ?
(1) .....
(2) .....
(3) .....

6.0 ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS SMALLHOLDER 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 (DAO)		
7. Ward Councillor (WC)		
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)	MAPATA meeting (ii)	Workshop or seminar (iii)	Field day (iv)
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 (DAO)	.....	.....	.....	.....
7. Ward Councillor (WC)	.....	.....	.....	.....
8. Extension Staff (ES)	.....	.....	.....	.....
9. Research Staff (RS)	.....	.....	.....	.....
10. Input Supplier (IS)	.....	.....	.....	.....

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

(1) (.....) RIPS staff
(2) (.....) MAPATA chairperson
(3) (.....) MAPATA secretary
(4) (.....) Division secretary
(5) (.....) Project Manager
(6) (.....) some one else please (specify).....

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

Title of the person	The purpose					
	To discuss on rice marketing problems (i)	To learn on improved rice technology and practices(ii)	To select the improved rice technology and practices	To plan for the following cropping season (iv)	To discuss on input procurement (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.WC	... .	.....	.....	.....	.....	.....
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 person	At least thrice a month	At least once a moth	At most twice per season	Not at all
1. MP	.....	.....	.....	.....
2. DC	.....	.....	.....	.....
3. DALDO	.....	.....	.....	.....
4. DEO	.....	.....	.....	.....
5. DS	.....	.....	.....	.....
6. DAO	....	.....	.....	.....
7. WC	.....	.....	.....	.....
8. (ES)	.....	.....	.....	.....
9. RS	.....	.....	.....	.....
10. IS	.....	.....	.....	.....

(f) How would you rate the usefulness of your 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 co-operation

APPENDIX II: INTERVIEW SCHEDULE FOR NON-MAPATA MEMBERS IN KINYOPE - MICRO IRRIGATION PROJECT

THE ROLE OF PARTICIPATORY APPROACH IN SMALLHOLDER FARMERS RICE PRODUCTION IN LINDI REGION: A CASE STUDY OF KINYOPE MICRO-IRRIGATION IN MILOLA, MINGOYO AND MTAMA DIVISIONS, LINDI DISTRICT

1. INTERVIEW SCHEDULE FOR NON-MAPATA MEMBERS IN KINYOPE -MICRO IRRIGATION PROJECT

(a) Date of interview.....
(b) Name of respondent.....
(c) Name of village.....
(d) Number of respondent.....
(e) Name of interviewer.....

2. INTRODUCTION

The purpose of the study is to examine the extent to which Kinyope Micro-Irrigation Project Participatory approach has contributed towards increased rice production through the dissemination of selected improved rice technology and practices in the Project area. You being a smallholder farmer who grow rice and closer to MAPATA members of the Kinyope Micro-Irrigation project in this village, you have been specifically selected to provide us with information about rice production and the approach as used by Kinyope Micro-Irrigation Project. The findings of the study will help the government and other rural development agencies to improve their extension approaches they use to advise the smallholder farmers. I kindly request for your co-operation with regard to this exercise. The information obtained from you will strictly be confidential.

3. SOCIAL DEMOGRAPHIC INFORMATION OF NON-MAPATA 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 you 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) .....

(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 acre
(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 the 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 course held ?
(1) (.....) Diocese Hall in Lindi town
(2) (.....) Lindi District Council Hall
(3) (.....) Rutamba Community Development College Conference Hall
(4) (.....) Village Godown
(5)(.....) Others (specify).....

4.0 SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT THE PATA MEMBERS HAVE ADOPTED IN KINYOPE MICRO-IRRIGATION PROJECT.

(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? Just respond *Yes* or *No* and mention the source.

Improved rice technologies or	**Yes (i)**	**No (ii)**	**Sources (iii)**				
practices			Agric. Dpt (1)	RIPS (2)	Own (3)	NARLEP (4)	Others (5)
1.Proper seedbed preparation	.....	.....	.....	.....	.....	.....	.....
2 Use of HYV TXD 85 or 88	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice (20 x 20cm)	.....	.....	.....	.....	.....	.....	.....
4.Use of graduated wooden row space	.....	.....	.....	.....	.....	.....	.....
5.construction of bunds	.....	.....	.....	.....	.....	.....	.....
6.Use of Manila strings	.....	.....	.....	.....	.....	.....	.....
7. Split application of fertilisers	.....	.....	.....	.....	.....	.....	.....
8.Use of Sickle for Paddy harvesting	.....	.....	.....	.....	.....	.....	.....
9.Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....

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

Improved rice technologies or practices	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 seedbed preparation	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Use of HYV TXD or 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Row planting of rice (20 x 20)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Use of wooden row space markers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5.Construction of bunds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6. Use of manila strings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7. Split application of fertilisers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 Appropriate rice grain storage		.....	.....	.....	.....	.....	.....	.....	.....	.....

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

Improved rice technologies or practices	Previous technology or practice is better		Technology or practice is consistent 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 seedbed preparation			.....	.....	.....	.....	.....	.....	.....	.....
2.Use of HYV TXD or 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3.Row planting of rice (20 x 20)	.....	.....	.....		.....	.....	.....	.....	.....	.....
4.Use of wooden row space markers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5.Construction of bunds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6. Use of manila strings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7. Split application of fertilisers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8. Use of sickles for paddy harvesting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9.Appropriate rice grain storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

5. EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG NON MAPATA MEMBERS DUE TO KINYOPE MICRO-IRRIGATION PROJECT'S PARTICIPATORY APPROACHES IN THE PROJECT AREA.

(a) Do you know your Village Extension Officer (VEO) ?
(1) (.....) yes
(2) (.....) no

(b) How frequent does the VEO visit you?
(1) (.....) once a week
(2) (.....) once a month
(3) (.....) thrice a month
(4) (.....) we visit VEO on need basis
(5) (.....) no visit at all

(c) Which of the following approaches do 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 moth (i)	At least once a month (ii)	At most twice per season (iii)	Not at all (iv)
1.MAPATA meetings				
2. Field demonstration	.....	.....	.....	.....
3.Workshops/ seminars	.....	.....	.....	.....
4.Field days	.....	.....	.....	.....
5.Trained demonstration farmers	.....	.....	.....	.....
6. Farm visits	.....	.....	.....	.....
7.Home visits	.....	.....	.....	.....
8.Leaflets	.....	.....	.....	.....

(d) From your experience with the 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 Kinyope Micro-Irrigation Project 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

(g) Are there any factors that have prevented you from adequately adopting the Kinyope Micro-Irrigation Project recommended 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 ?

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 or practices are too expensive	.....	.....	.....
5. Recommended technologies or practices are not available	.....	.....	.....
6. Recommended technologies or practices do not improve rice production	.....	.....	.....
7. Lack of market 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 advise from VEO	.....	.....	.....
13.Unfavourable weather conditions	.....	.....	.....
14. GDF not co-operative	.....	.....	.....
15. Inadequate tractors to plough the fields	.....	.....	.....

(i) Are you aware of the existence of MAPATA in your village ?
(1) (.....) yes
(2) (.....) no

(j) What motivated you to the extent that you want to join the rice MAPATA?
(1) .....
(2) .....

(k) What discouraged you to the extent that you don't want to join the MAPATA ?
(1).....
(2).....

(l) Are there any noticeable differences between you and the farmers who are already in rice MAPATA?
(1) (.....) yes
(2) (.....) no

(m) If the answer is *Yes* in (5l) above, mention any 3 main differences.
(1).....
(2).....

6.0 ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS SMALLHOLDER 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 (DAO)		
7. Ward Councillor (WC)		
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)	MAPATA meeting (ii)	Workshop or seminar (iii)	Field day (iv)
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 (DAO)	.....	.....	.....	.....
7. Ward Councillor (WC)	.....	.....	.....	.....
8. Extension Staff (ES)	.....	.....	.....	.....
9. Research Staff (RS)	.....	.....	.....	.....
10. Input Supplier (IS)	.....	.....	.....	.....

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

(1) (.....) RIPS staff
(2) (.....) MAPATA chairperson
(3) (.....) MAPATA secretary
(4) (.....) Division secretary
(5) (.....) Project Manage
(6) (.....) some one else please (specify).....

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

Title of the person	The purpose					
PEOPLE	To discuss on rice marketing problems (i)	To learn on improved rice technology and practices(ii)	To select the improved rice technology and practices	To plan for the following cropping season (iv)	To discuss on input procurement (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.WC	.....	.....	.....	.....	.....	.....
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 person	At least thrice a month	At least once a moth	At most twice per season	Not at All
1.MP	.....	.....	.....	.....
2.DC	.....	.....	.....	.....
3.DALDO	.....	.....	.....	.....
4.DEO	.....	.....	.....	.....
5.DS	.....	.....	.....	.....
6.DAO	.....	.....	.....	.....
7.WC	.....	.....	.....	.....
8.(ES)	.....	.....	.....	.....
9.RS	.....	.....	.....	.....
10.IS	.....	.....	.....	.....

(f) How would you rate the usefulness of your 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 co-operation

APPENDIX III: SEMI-STRUCTURED INTERVIEW SCHEDULE FOR KEY INFORMANTS IN KINYOPE MICRO-IRRIGATION PROJECT.

ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN LINDI REGION: THE CASE STUDY OF KINYOPE MICRO-IRRIGATION PROJECT IN MILOLA, MINGOYO AND MTAMA DIVISIONS LINDI DISTRICT.

1. SEMI-STRUCTURED INTERVIEW SCHEDULE FOR KEY INFORMANTS IN KINYOPE MICRO-IRRIGATION PROJECT.

(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 Kinyope Micro- Irrigation Project Participatory approach has contributed towards increased rice production through the dissemination of selected improved rice technologies and practices in Lindi District. You being involved in Kinyope Micro Irrigation project activities in relation to smallholder farmers rice production in Milola, Mingoyo, and Mtama Divisions, I will appreciate if you can provide us with information about the selected improved rice technologies and practice and the approaches as used by the extension staff. The findings of the study will help the government agencies to improve the extension approaches they use to help the smallholder farmers. I kindly request for your co-operation with regard to this exercise. The information taken from you will be strictly confidential.

3. SOCIAL DEMOGRAPHIC INFORMATION OF KEY INFORMANTS

(a) Who is you employer.....
(b) What is your gender.....
(c) What is your age.....
(d) What is your highest level of education?.....
(e) What is your profession.....
(f) What is you 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 SMALLHOLDER RICE FARMERS HAVE ADOPTED IN MILOLA, MINGOYO AND MTAMA DIVISIONS AS A RESULT OF KINYOPE MICRO-IRRIGATION PROJECT PARTICIPATORY APPROACHES.

(a) Are you aware of the Kinyope Micro-Irrigation project activities in the District/Division?

(b) Have you ever visited Kinyope Micro-Irrigation project villages in Milola, Mingoyo and Mtama Divisions?

(c) What is you observation in the adoption of improved rice technologies and practices among the smallholder rice farmers in groups and those not in groups?
(i) MAPATA members
(ii) Non-MAPATA members

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

(1)
(2)
(3)

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

(I) Encouraged:
(1) .....
(2) .....
(3) .....
(4) .....

(II) Discouraged:
(1) .....
(2) .....
(3) .....
(4) .....
(5) .....

5. EFFECT OF ADOPTION ON INCREASED RICE YIELDS AMONG SMALLHOLDER MICRO-IRRIGATION PROJECT PARTICIPATORY APPROACHES

(a) In your visit to Milola, Mingoyo, and Mtama Division, which extension approaches are frequently used by extension officers?

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

(b) What is you comments on the extension approaches used?

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

(c) Basing on you 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) MAPATA members:
(1).....
(2.....
(II) Non-MAPATA:
(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) .....

(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) .....

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

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

(ii) MAPATA members

(ii) Non-MAPATA

6. ATTITUDE OF KEY ACTORS WITH RESPECT TO WORKING TOGETHER TO ADDRESS RICE PRODUCTION CONSTRAINTS OF SMALLHOLDER FARMERS IN MILOLA, MINGOYO AND MTAMA DIVISIONS.

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

(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 place do you normally meet together ?

(1) .....

(2) .....

(3) .....

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

(1) .....

(2) .....

(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) Has the technical package advocated by Kinyope Micro-Irrigation Project increased the rice smallholder farmers food production?

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

(h) Are there any noticeable differences between Kinyope Micro-Irrigation project and other extension programmes operated or operating in this District/Division?

(i) If the answers is *Yes*, mention the differences

(1) .....

(2) .....

(3) .....

(j) What is you recommendation(s) to Ministry of Agriculture and Food and Agriculture Organisation (MAC/FAO) with respect to Kinyope Micro Irrigation project activities, if the smallholder farmers are to be assisted to find the way out of food insecurity?

(1) .....

(2) .....

(3) .....

Thank you very much for your co-operation

APPENDIX IV: SEMI-STRUCTURED INTERVIEW SCHEDULE FOR EXTENSION STAFF WORKING IN MILOLA, MINGOYO AND MTAMA DIVISION.

ROLE OF PARTICIPATORY APPROACHES IN SMALLHOLDER FARMERS RICE PRODUCTION IN LINDI REGION: THE CASE STUDY OF KINYOPE MICRO-IRRIGATION PROJECT IN MILOLA, MINGOYO AND MTAMA DIVISIONS LINDI DISTRICT.

1. SEMI-STRUCTURED INTERVIEW SCHEDULE FOR EXTENSION STAFF

(a) Date of interview.....
(b) Name of respondent.....
(c) Working station.....
(d) Number of respondent.....
(e) Name of interviewer.....

2. INTRODUCTION

The of this study is to examine the extent to which Kinyope Micro-Irrigation Project Participatory Approaches have contributed towards increased rice production through the dissemination of selected improved rice technologies and practices in Milola, Mingoyo and Mtama Divisions. You being among the extension staff working with smallholder farmers in the Division, I would like to request 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 you co-operation with regard to this exercise. The information taken from you will be strictly confidential.

3. SOCIAL DEMOGRAPHIC INFORMATION OF EXTENSION STAFF

(a) Who is you employer.....
(b) What is your gender.....
(c) What is your age.....
(d) What is you marital status.....
(e) What is your highest level of education?.....
(f) What level of agriculture or livestock training did you attain.....
(f) 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) Has the course improved your technical know-how and communication skills?

4.0 SELECTED IMPROVED RICE TECHNOLOGIES AND PRACTICES THAT RICE SMALLHOLDER FARMERS HAVE ADOPTED IN KINYOPE PROJECT.

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

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

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

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

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

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

(i) Adopting
(1) .....
(2) .....
(3) .....
(4) .....
(5) .....
(6) .....
(ii) Not adopting
(1) .....
(2) .....
(3) .....
(4) .....
(5) .....
(6) .....

(e) Has the selected trained demonstration farmers contributed any input to you 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) MAPATA Members
(ii) Non-MAPATA 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) .....

(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 MILOLA, MINGOYO, AND MTAMA DIVISION

(a) How frequent do you work together with smallholder farmers, research staff, input suppliers 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) .....

(c) Are the Approaches Advocated by Kinyope Micro-Irrigation Project (demonstration, field days, workshops/seminars, MAPATA meetings, trained demonstration farmers) useful in effecting your working together to address smallholder rice farmers production constraints?

(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 project increased smallholder rice farmers awareness of using the improved technologies and practices than what they knew before?

(f) From Your opinion, what are the best attributes of Kinyope Micro-Irrigation project that have accelerated the transfer and adoption of selected improved rice technologies and practices among smallholder rice farmers?

- (1) .....
- (2) .....
- (3) .....

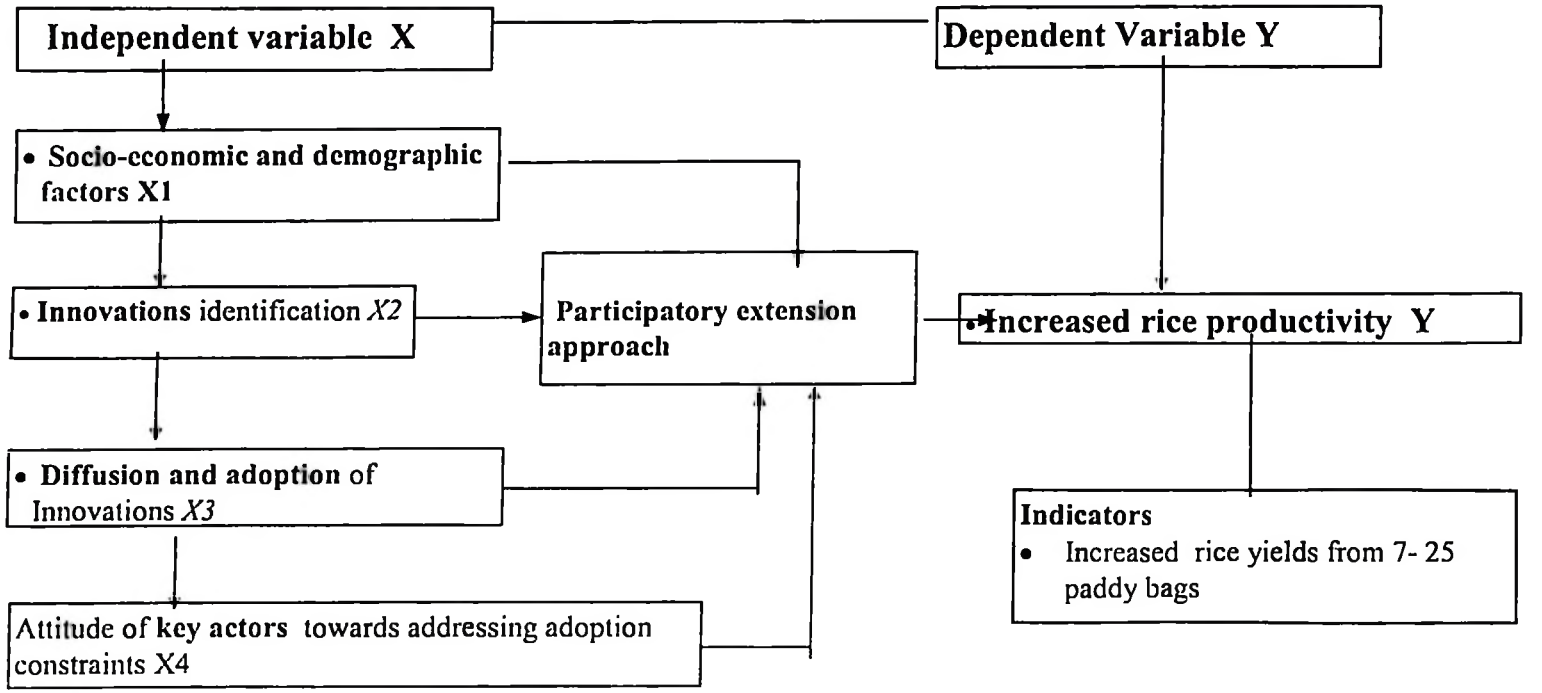
(g) Do you think the smallholder rice farmers will continue to use the selected improved rice technologies and practices after the project ends ?

(h) Mention the areas that in future the Ministry of Agriculture and RIPS should do to improve the transfer and adoption of improved rice technologies and practices to small rice farmers?

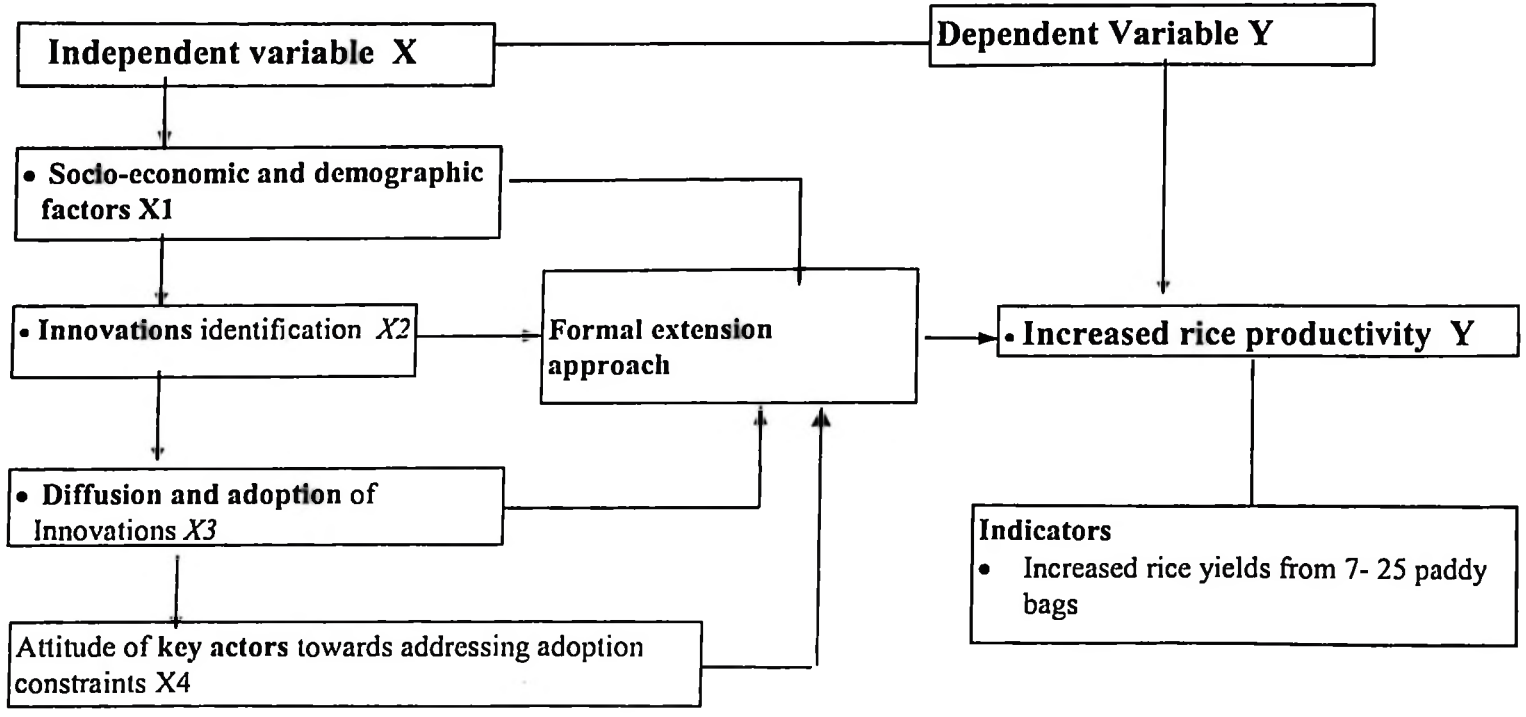
- (1) .....
- (2) .....
- (3) .....
- (4) .....
- (5) .....

Than you very much for your co-operation

Appendix V: Conceptual framework of the role of participatory approach in Kinyope Micro Irrigation Project in Lindi Rural District(Non-MAPATA)



Appendix VI Conceptual framework of the role of formal extension in Kinyope Village in Lindi Rural District (MAPATA)



Appendix VII: Tanzania's contribution to the national economy

Parameter	1970	1975	1980-82	1985-87	1990-92	1997-98
Agricultural share of net export value	-	-	90	85	67	51
Agriculture share of GNP	49	45	49	46	45	50
Agriculture share of imports						
• Fertiliser	-	-	2	4	4	1
• Food	-	-	13	10	3	4
Agriculture share of labour force employment	90	88	86	85	84	82
Population in rural areas	93	90	85	82	79	75

Source: World Bank

Appendix VIII: Wealth ranking in Kinyope village as per 9/12/-1995

Sub-Village/Group	A	B	C	TOTAL
Shuleni	5	42	65	112
Sokoni	5	26	46	77
Namkopo	21	55	33	109
Gulioni	7	42	28	77
TOTAL	38	165	172	375
Average	10	40	43	
Percentage	10.1	44.0	45.9	

Source: Project Reports RAS' Office-Lindi

Appendix IX: Crop combination (Pair-wise) based on income generation

CROPS	Rice	Maize	Sorghum	Cassava	Peas	Simsim	Tomatoes	Cowpease	Okra	Onion	Pumkins	Scores	Position
Rice		Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	10	1
Maize			Maize	Maize	Maize	simsim	Tomatoes	Cowpeas	Okra	Onion	Maize	4	6
Sorghum				Sorghum	Sorghum	Simsim	Tomatoes	Cowpeas	Sorghum	Onion	Sorghum	4	6
Cassava					Peas	Simsim	Tomatoes	Cowpeas	Okra	Onion	Cassava	1	8
Peas							Tomatoes	Cowpeas	Okra	Onion	Peas	2	7
Simsim						Simsim	Simsim	Cowpeas	Simsim	Simsim	Simsim	9	2
Tomatoes								Cowpeas	Tomatoes	Onion	Tomatoes	7	4
Cowpeas									Cowpeas	Onion	Cowpeas	6	5
Okra										Onion	Okra	4	6
Onion											Onion	8	3
Pumkins												0	10

Source: Kinyope Project Reports (PRA report)

Appendix X: Crop Combination (Pair-wise) based on food

CROPS	Rice	Maize	Sorghum	Cassava	Peas	Simsim	Tomatoes	Cowpease	Okra	Onion	Pumkins	Scores	Position
Rice		Maize	Sorghum	Cassava	Peas	Rice	Rice	Rice	Rice	Rice	Rice	6	5
			Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	10	1
Sorghum				Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	Sorghum	9	2
Cassava					Cassava	Cassava	Cassava	Cassava	Cassava	Cassava	Cassava	8	3
Peas						Peas	Peas	Peas	Peas	Peas	Peas	7	4
Simsim							Tomatoes	Cowpeas	okra	Onion	Pumkins	0	
Tomatoes								Cowpeas	Okra	Tomato	Pumkins	2	9
Cowpeas									Cowpeas	Cowpeas	Cowpeas	5	6
Okra										Okra	Pumkins	3	8
Onion											Pumkins	1	10
Pumkins												4	79

Source: Kinyope Project Reports (PRA report)

Appendix XI: Lindi Region irrigation potentials

No	Village	District	Acre
1	Kinyope	Lindi (R)	1500
2	Milola	Lindi (R)	800
3	Rutamba	Lindi (R)	750
4	Lukuledi River Valley	Lindi (R)	9200
5	Mtumbikile	Lindi (R)	600
6	Makangaga	Kilwa	1450
7	Mavuji	Kilwa	160
8	Matekwe	Nachingwea	120
9	Mangirikiti	Liwale	250
	TOTAL		14830 (5932 ha)

Source: Regional Administrative Secretary's Office Lindi

Appendix XII: Distribution of agriculture and livestock experts in Lindi Region

Area/Profession	Regional Administrative Secretariat	Ruangwa	Liwale	Lindi (R) & (UR)	Nachingwea	Kilwa	Total
Agriculture	3	11	14	34	24	21	102
Livestock	1	6	5	20	13	6	51
Total	4	17	19	54	37	27	158
Total division	28	5	3	9	5	6	28
Total wards	116	17	19	36	27	21	116
Total villages	373	81	39	107	65	86	373

Source: RAS' Office-Lindi

Appendix XIII: Rainfall records -Lindi Region for 1999/2000

District/Month	July Mm/day	August Mm/day	Sept Mm/day	Oct Mm/day	Nov Mm/ day	Dec Mm/ day	Jan Mm/ day	Feb Mm/ day	March Mm/day	April Mm/ day	May Mm/ day	June Mm/day	Total Mm/ day
Lindi	7.3/3	12.2/2	11.3/4	8.8/1	11.3/3	197.2/15	45.9/6	45.9/6	296/19	122/9	71.8/7	16.8/2	846/79
Nachingwea	4.2/1	-	-	-	34.1/9	118/11	14/1	107/10	294.8/21	45.5/11	3.3/2	12.2/2	633.1/68
Kilwa	-	22.6/2	24.4/2	7.0/2	58.0/6	171.6/6	9.7/2	58.0/6	263./19	82.8/9	126/7	7.4/2	830.5/65
Liwale	-	-	-	2.8/1	72.2/5	93.1/6	78.3/4	36.7/6	312/19	59.1/1	17.5/1	-	671.7/43
Total average	5.7/2	17.4/4	17.8/3	6.2/1	43.9/6	144.9/10	36.9/3	61.9/7	291.4/20	77.3/8	54.6/4	12.1/2	764.4/70

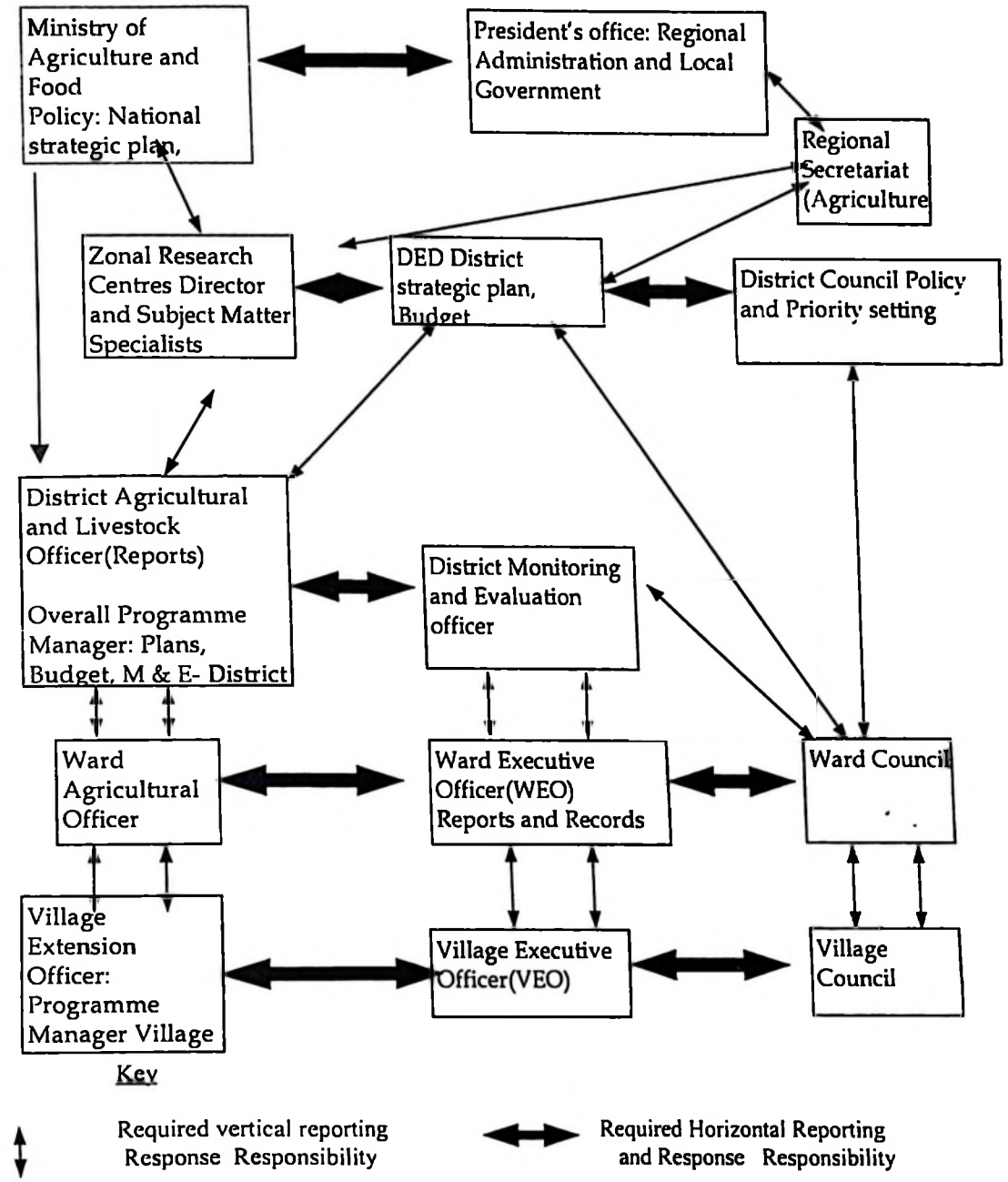
Source: RAS' Office-Lindi

Appendix XIV: Agricultural data Lindi Region 1993/94 - 2000/2001

Crop	1993/94		1994/95		1995/96		1996/97		1997/98		1998/99		1999/2000		2000/2001	
	Ha	Ton	Ha	Ton	Ha	Ton	Ha	To	Ha	Ton	Ha	Ton	Ha	Ton	Ha	To
Cassava	40719	97935	40219	96985	34930	81283	32277	61133	22321	46637	63264	140530	53848	141225	55176	97022
Sorghum	31892	31892	29349	27375	27069	24222	28319	25730	40270	40638	39285	38882	35112	39913	38092	27838
Maize	38705	46390	37314	47892	33401	45859	45597	52226	36065	39206	37860	52870	47622	57333	55038	45843
Paddy	16397	20449	12713	16626	18625	12774	11568	9141	16714	16020	9960	12675	14224	15083	18351	40839
Legumes	8555	6399	16808	11036	11095	8830	17918	13323	14672	11718	30110	22904	26553	19773	26612	20430
S/ potatoes	2913	2913	275	275	657	657	104	104	486	486	978	978	276	277	352	352
Millets	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	21
Cashewnut	882	5120	3126	3429	12304	11585	9512	9516	10023	16480	17688	14737	18294	17652	41307	17463
Simsim	9092	6763	6992	5039	15920	14628	25950	12015	9919	8621	21292	19212	39160	11925	30303	19930
Groundnuts	431	3230	2235	1409	2171	1628	1805	1362	2557	1661	3480	2719	3051	2805	6032	5372
Coconut	749	2211	1660	1217	1970	5713	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
Sisal	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
Sunflower	-	-	-	-	-	-	-	-	-	-	-	-	62	46	116	87
Soya	Na	Na	18	13	23	17	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

Source: RAS' Office-Lindi

Appendix XV: Organisational Arrangements with Devolution of Provision of Agriculture Service



Source: AGREST , 1999