PARTICIPATION OF BENEFICIARY FARMERS IN LARGE SCALE IRRIGATION SCHEME MANAGEMENT: A CASE STUDY ON 'KOGA IRRIGATION PROJECT' IN MECHA DISTRICT OF AMHARA REGIONAL STATE, ETHIOPIA

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DECLARATION

I hereby declare that the Dissertation entitled ***PARTICIPATION OF BENEFICIARY FARMERS IN LARGE SCALE IRRIGATION SCHEMES MANAGEMENT: A CASE STUDY ON "KOGA IRRIGATION PROJECT" IN MECHA DISTRICT OF AMHARA REGIONAL STATE, ETHIOPIA*** submitted by me for the partial fulfillment of the M.A. in Rural Development to Indira Gandhi National Open University, (IGNOU) New Delhi is my own original work and has not been submitted earlier either to IGNOU or to any other institution for the fulfillment of the requirement for any course of study. I also declare that no chapter of this manuscript in whole or in part is lifted and incorporated in this report from any earlier work done by me or others.

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SUMMARY

In recent years, the Government of Ethiopia has given special attention for the development of irrigation schemes in order to attain its goal of food self-sufficiency. The government's commitment for the development of irrigation system has been shown through its Water Sector Development Plan. In response to this government's commitment, different irrigation schemes were planned and implemented by the government. Koga Irrigation Project, the country's first type large scale irrigation scheme for small farmers, is among the irrigation schemes constructed by the government. The objectives of this study are: Evaluating the extent of beneficiary farmers' participation in the MOM of large scale irrigation scheme; Examining the willingness of beneficiary farmers to participate in the MOM of large scale irrigation scheme; and Identify external factors that affect the willingness of beneficiary farmers to participate in the MOM of large scale irrigation schemes.

To maintain these objectives, the relevant and important primary data were collected from beneficiary farmers and relevant institutions using data collection tools of structured interview and discussion. The data collected from sample beneficiary farmers, which were selected using a stratified random sampling method, were analyzed using descriptive statistical analysis method.

The study result showed that the extent of beneficiary farmers' participation in the management, operation and maintenance of large scale irrigation scheme was less satisfactory. This beneficiary's low level of participation was verified

using performance of irrigation system indicators, mainly quality of irrigation system and agricultural performance.

Regarding beneficiaries' willingness to participate in the management, operation and maintenance of irrigation systems, as the study result showed, was positively affected by the variables of educational level, wealth status, off-farm economic activities, and irrigation experience. On the contrary, age and land renting/sharecropping negatively affect beneficiaries' willingness to participate in the management, operation, and maintenance of irrigation system.

The study has also found out that the willingness of beneficiary farmers to participate in the MOM of irrigation system was affected by the timeliness, adequacy, quality, etc. of the support given by the concerned institutions.

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LIST OF ABBREVIATIONS

ARD	:	Agricultural and Rural Development
BCM	:	Billion Cubic Meter
CIS	:	Corrugated Iron Sheet
FAO	:	Food And Agricultural Office
GDP	:	Gross Domestic Product
GOE	:	Government of Ethiopia
Ha	:	Hectare
HH	:	Household
I&D	:	Irrigation and Drainage
IMT	:	Irrigation Management Transfer
LSI	:	Large Scale Irrigation
LSIS	:	Large Scale Irrigation Scheme
MCM	:	Million Cubic Meters
MOM	:	Management, Operation and Maintenance
MOW	:	Ministry of Water
O&M	:	Operation and Maintenance
PA	:	Peasant Association
PIM	:	Participatory Irrigation Management
TLU	:	Tropical Livestock Unit
WB	:	World Bank
WUA	:	Water User Association

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND INFORMATION

Agriculture is the main sector of Ethiopia's economy, accounting for 45 percent to GDP, 60 percent of the foreign exchange earnings, provides livelihood to 85 percent of the population and employing 85% of the labour force. According to Central Statistics Authority [CSA, 1995-1999], within agriculture, some 60 percent of the output is from crops, with livestock and forestry producing 30 percent and 7 percent respectively. Crop production by area is predominantly cereals (84.55 percent) followed by pulses (11.13 percent) and others (4.32 percent). Over 95% of all cereals, oilseeds and pulses are produced by the smallholder sector under rain fed condition, accounting a total area of approximately 10 million hectares. This means that the ability of the nation to address food and nutritional insecurity, poverty, and to stimulate and sustain national economic growth and development is highly dependent on the performance of agriculture.

Owning to the country's rain fed based agricultural system; there has been frequent crop failures and subsequent chronic food shortage in the country. To reverse this unpleasant situation in the one hand, on the other hand to increase the productivity of land and labour, the importance of de-linking the agriculture from the strong linkage to rainfall variability through irrigation and

improved agricultural water management practice has been recognized and priority has been given since the last two decades.

The major sources of growth for Ethiopia is still conceived to be the agriculture sector, as it is expected to be insulated from drought shocks through enhanced utilization of the water resource potential of the country (through development of small scale irrigation, water harvesting, and on-farm diversification), coupled with strengthened linkages between agriculture and industry (agro-industry), thereby creating demand for agricultural output (MOFED 2006).

Irrigation is one means by which agricultural production can be increased to meet the growing demands in Ethiopia (Awulachew et al. 2005). A study also indicated that one of the best alternatives to consider for reliable and sustainable food security development is expanding irrigation development on various scales, through river diversion, constructing micro dams, water harvesting structures, etc. (Robel 2005).

Many studies suggest that large investments in irrigation have been an essential element in increasing food production to sustain the ever-growing population. To meet food requirements by 2020 (world population is estimated to reach 8 billion), FAO (1995) estimated that food production from irrigated areas will need to increase from 35 per cent in 1995 to 45 per cent in 2020. This indicates that access to water for irrigation will become an issue of global concern and competition in the future, especially in the arid and semi-arid regions of the world (Seid Hassen, 2002)

Another advantage of irrigation is that the possibility of intensification of agricultural practices, especially in areas where arable land is a scarce resource. Irrigation provides the means of maximizing production with double or multiple cropping, taking full advantages of modern technologies and high yielding crop varieties. Moreover, irrigation provides farmers an opportunity to grow high value crops like vegetables and fruits that require year round and generous supply of water to grow. Such diversification of agricultural products will ensure reliable income source to the farming community.

Based on the Ministry of Water Resources (MoWR) classification, irrigation projects in Ethiopia are identified as large-scale irrigation if the size of command area is greater than 3,000 hectares, medium-scale if it falls in the range of 200 to 3,000 hectares and small-scale if it is covering less than 200 hectares (see also Werfring (2004); Awulachew et al. (2005)).

The country Ethiopia has 12 river basins. The total mean annual flow from all the 12 river basins is estimated to be 122 BMC (MoWR 1999). The total irrigation potential of the country is estimated at 3 million hectares. The total estimated area of irrigated agriculture in the country is 107,265.65 hectares out of which 20,038.39 hectares are from small-scale, 30,291.26 hectares is from medium-scale and 56,936 hectares is from large scale. The large-scale irrigation schemes consist of 53 percent of the irrigation schemes developed so far (Awulachew, S. B.; Yilma, A. D. et.al, 2007). It is also estimated that out of the total annual production of cereals in the country, only about 3 per cent is

produced through irrigation (ONCCP 1990). Currently, the MoWR (Ministry of Water Resources) has identified 560 irrigation potential sites on the major river basins.

Table 1: Large Scale Irrigation Potential in the River Basins of Ethiopia.

S.N	River Basins	Area (km^2)	Total and Large Scale Irrigation Potential		
			Total Irrigation potential(Ha)	LSI potential (Ha)	% of LSI Potential
1	Abbay	198,890.7	815,581	639330	78.4
2	Tekeze	83,475.94	83368	83368	100
3	Baro-Akobo	76,203.12	1019523	1019523	100
4	Omo-Ghibe	79,000	67928	57900	85.2
5	Rift Valley	52,739	139300	45700	32.8
6	Awash	110,439.3	134121	79065	58.9
7	Genale Dawa	172,133	1074720	1044500	97.2
8	Wabi Shebele	202,219.5	237905	171200	72.0
9	Denakil	63,852.97	158776	110811	69.8
10	Ogaden	77,121	-		
11	Ayisha	2,000	-		
	Total	1,118,074.5	3,731,222	3,251,397	87.1

Source: water resource and irrigation development in Ethiopia (Awulachew, S. B. et.al. 2007)

There is no written history on how Ethiopia has used irrigation technologies to secure agricultural production, as the vast country with small population had

adequate natural resources base and rainfall to produce the food requirements without the need to develop irrigation.

Private concessionaires who operated farms for growing commercial crops such as cotton, sugarcane and horticultural crops started the first formal irrigation schemes in the 1950s in the upper and lower Awash Valley. In the 1960s irrigated agriculture was expanded in all parts of the Awash Valley and in the Lower Rift Valley. The Awash valley saw the biggest expansion in view of the water regulation afforded by the construction of the Koka dam and reservoir that regulated flows with benefits of flood control, hydropower and assured irrigation water supply. In addition, the construction of the tarmac Addis-Assab road opened the Awash Valley to ready markets in the hinterland as well as for export (Metaferia, 2004).

Although certain aspects of the development during the pre-Derg era have wrong doings in terms of property and land rights, there has been remarkable emergence of irrigation development and establishment of agro industrial centers (Awulachew, S. B.; Yilma, A. D. et.al, 2007). During the Derg era, all private farms were nationalized to establish the so-called state farms, thereby ending the embryonic private sector. The government pursued the development of medium and large-scale irrigation schemes in a number of river basins in addition to expansion in the Awash Valley. The current government, on the other hand, has shown its commitment for irrigation development through its Water Sector Development Plan, which envisaged to expand large and medium

scale irrigation by about 147,000 ha and small scale irrigation by about 127,000 ha.

Consequent to these policy measures and strategies, particularly since 2004, development of traditional and small scale irrigation projects has shown, under the responsibility of Regional Governments, significant growth. In the same manner, medium and large scale public irrigation projects, which are financed and undertaken by the federal government, have shown remarkable growth.

The amplitude number of government sponsored irrigation projects that are constructed and being constructed is an indicator that shows the GOE's commitment for irrigation development, as part of its development strategy. Experiences of different countries, however, have shown that irrigation projects controlled and managed by government have a problem of inefficiency which hampers attainment of benefits expected of them. Critical factors attribute for this inefficiency problem are lack of sufficient allocation of funds for operation and maintenance, inequality in the distribution of water among the beneficiary farmers, deterioration of irrigation infrastructure, and lack of involvement of farmers.

On the contrary, irrigation systems where farmers actively participate in the irrigation management there is marked improvement in water utilization efficiency (Gandhi and Namboodiri 2002). This change/transfer in irrigation management whereby farmers take over the management of operation and maintenance while government agencies mainly focus on developing and

improving the management of water at the main system level has been supported by many researchers including Vaidyanathan 1999, Subramanian et.al. 1997, and Meinzen-Dick and Mendoza 1996. Such ideas have led to the promotion of Participatory Irrigation Management (PIM)

Participatory Large scale Irrigation Scheme is the focus of this study. The distinguishing feature of this irrigation scheme is that beneficiary farmers will actively participate in the management of the irrigation system through formation of Water Users Association (WUA), so that the irrigation schemes become efficient, sustainable and equitable. Understanding the importance of this participatory approach(PIM), the Federal Government of Ethiopia has allocated huge amount of money and has commenced development of participatory large scale irrigation schemes since the last about ten years. So far, one participatory large scale irrigation project is constructed and has been giving service since the last 3 years while dozens of similar irrigation projects are under construction/ study.

The aim of this research, therefore, is to assess the extent of beneficiary farmers' participation in large scale irrigation schemes where PIM approach has adopted; and to provide direction/guideline to enhance participation in the existing and in the up-coming similar irrigation projects.

1.2 STATEMENT OF THE PROBLEM

The human as well as bovine population has been increasing all over the world and more so in Ethiopia. As such the need of food, fiber, fuel, fodder etc. has also been increasing with fast rate. It is, hence, imperative to increase the agricultural production to keep pace with the requirement. Irrigation being lifeline of agriculture, its development and meticulous management has been given serious attention by governments of many countries in the world. As a result there were rapid increases of irrigated area in the 1970s and 1980s to temporarily address the food crisis.

Subsequent to this rapid increase, many governments have had serious difficulties in providing adequate recurrent funds for the management, operation and maintenance (MOM) of irrigation schemes though money for capital works was available from international development funding agencies (such as the World Bank). In addition operation of the irrigation system by government agencies has, in many cases, been poor, with operation and maintenance (O&M) staff poorly paid and poorly motivated. As a consequence of the failure to adequately operate and maintain them, the irrigation systems have fallen into disrepair, leaving many farmers with unreliable, inadequate and untimely supplies of irrigation water. Agricultural production and rural livelihoods have suffered, and the contribution to the national economy has declined.

Besides the above mentioned financial and staff problems in MOM, there are problems like conflicts on the schedule and distribution of irrigation water, poor and costly systems of water fee collection, less sense of ownership, less farmers satisfaction, etc. in almost all irrigation schemes that are managed by governments.

To solve these problems associated with irrigation schemes, World Bank in late 1980s had introduced an institutional reform called Participatory Irrigation Management (PIM). The World Bank (1996) defines Participatory Irrigation Management (PIM) as "the involvement of irrigation users in all aspects and all levels of irrigation management"

During last three decades about 60 countries having significant irrigated area have adopted PIM in varying degrees and ways with following objectives (FAO, 2007):

- Reduce the recurrent government expenditure on O&M by replacing financially self- relayed water service provider.
- Reverse the increasing rate of deterioration of irrigation infrastructure.
- Provide transparency in management and accountability of the service from provider to water user.
- Improve the efficiency and sustainability of irrigation systems

Likewise, the Government of Ethiopia has adopted PIM in its public large scale irrigation scheme as clearly shown on 'Koga Irrigation Project document', the first large scale irrigation scheme constructed in the country for small farmers. However, no study has been done so far in the country, Ethiopia, to find out the extent of beneficiaries' participation, their level of willingness to participation, the factors influencing their level of participation, and the role of responsible government institutions in promoting beneficiary farmers participation. Therefore, it is important to undertake the proposed study in order to identify, analyze and document the current status and the underlying reasons of beneficiary farmers' participation; and also to provide valuable resources to policy makers and implementing institutions in their effort to maximize beneficiaries' participation in large scale irrigation schemes.

1.3 SIGNIFICANCE OF THE PROBLEM

The country Ethiopia has given serious attention for the development of irrigation schemes so as to achieve the goal of food self-sufficiency. This government's commitment has been reflected in the different development policies issued by the country. Among these policies and strategies, Ethiopian Water Resource Development Policy issued by Ministry of Water Resource is the one. The main objectives of this Water Resources Management Policy are:(i) promote the development of the water resources of the country for economic and social benefits of the people, on equitable and sustainable basis;(ii) manage and combat drought as well as other drought associated impacts, and

disasters through efficient allocation, redistribution, transfer, storage and efficient use of water resources; (iii) conserve, protect and enhance water resources and the overall aquatic environment on sustainable basis; and (iv) to develop and enhance small and large-scale irrigated agriculture and grazing lands for food self-sufficiency at the household level and for food export.

To achieve the objectives of the above mentioned Policy, Government strategy is to fully integrate irrigation with the overall framework of the country's socio-economic development plans as an integral part of the water sector. Farmers' participation will be promoted at all stages, taking into account the needs of rural women. Small, medium, and large-scale irrigation will be promoted and cost recovery models will be developed to ensure sustainability. Steps will be taken to ensure the prevention and mitigation of degradation of irrigated water and to maintain acceptable water quality standards for irrigation. To this end, a reasonable percentage of GDP will be earmarked as a committed resource towards the development of irrigated agriculture.

In consonance with these policy measures, the Government of Ethiopia has been constructing irrigation schemes in all potential areas of the country in its utmost effort. Among these irrigation schemes, which are also the interest of this study, large scale irrigation schemes for small farmers are the major one. As stated in the government's strategy, participation of farmers in the development of large scale irrigation schemes that target small farmers has given special attention.

In order to understand the reason why the Government of Ethiopia adopts farmers' participation as one of the strategies for the implementation of its Water Resource Development Policy, it is worth mentioning some of the problems associated with irrigation schemes. Some of the problems noticed in irrigation schemes which have been implemented and operated by governments, without involving farmers, are:

- Financial burden on government and thus lack of recurrent budget for management, operation and maintenance of irrigation schemes
- Unreliable, inadequate and untimely supplies of irrigation water
- High level but less effective operation and maintenance staff
- Lack of ownership
- High incidence of conflict among users
- Poor cost recovery performance
- Agricultural production and rural livelihoods have suffered, and the contribution to the national economy has declined; etc.

So, it is necessary to evaluate the extent at which this the government's strategy is put into practice in order to identify any gaps and recommend corrective measures both for the already operational and under-construction public large scale irrigation schemes.

1.4 DEFINITION OF KEY TERMS/CONCEPTS

Management

Management can be described as (Jurriens, 1991): The organised use of resources, in a given environment, for the planning, operation and monitoring of certain tasks to convert inputs into outputs according to set objectives.

Participation

Participation is defined as a process through which stakeholders' influence and share control of development initiatives and of decisions and resources that affect them (ADB, 2012). Participation comes in a variety of forms, and may range from merely sharing information about plans and schedules, to discussions which allow stakeholders to suggest ideas, to decision-making based on mutual agreement and full transfer of responsibility and authority to local control.

Participatory Irrigation Management

The World Bank (1996) defines Participatory Irrigation Management (PIM) as "the involvement of irrigation users in all aspects and all levels of irrigation management": "***Involvement***" is flexible, ranging from light involvement like information sharing, consultation, and joined assessment of problems to real involvement like shared decision making, collaboration, and full say by the water users; "***Users***" refer to water users. The World Bank employs the word userism to express the essence of PIM, because it is management of the users,

by the users and for the users; "***All aspects***" include the initial planning and design of new irrigation projects or improvements, as well as the construction, supervision, and financing, decision rules, operation, maintenance, monitoring and evaluation of the system; "***All levels***" may include tertiary, secondary, main system level as well as project and sector level.

Water Users Association (WUA):

- WUA is a cooperation association of Water users who wish to undertake water related activities for their mutual benefit.
- Water User Association refers to the grouping of water users, usually farmers, who are taking water from one or more sources (such as reservoirs, irrigation canals, pumping stations) for the purpose of managing part of an irrigation and drainage system.
- A Water User Association is also defined as a non-profit organization, established by water users to ensure that farmers receive sufficient irrigation water when they needed. The boundary of the association can be based on a hydraulic unit, irrigation scheme or part of it, or a village administered area.
- A Water User Association (WUA) is a co-operative association of individual water users who wish to undertake water-related activities for their mutual benefit. The specific nature of the service that a WUA provides will differ from case to case: as the name suggests, a water *user* association is an

institution that serves its members. Because member needs will differ from one area to another, a WUA is normally established in response to the aspirations of its members. That is, its design conforms to their specifications.

1.5 OBJECTIVES OF THE STUDY

The aim of the proposed study is to show the current status of beneficiary farmers' participation in public large scale irrigation scheme along with the major determining factors; and to provide baseline information for policy makers and implementing institutions in their effort to maximize people participation in large scale irrigation schemes. The specific objectives of the study are:

1. To examine the extent of beneficiary farmers participation in the management, operation and maintenance of public large scale irrigation schemes
2. To examine the willingness of beneficiary farmers to participate in the management, operation and maintenance of large scale irrigation schemes
3. To evaluate the extent of institutional support services which influence the perception of beneficiary farmers towards the irrigation scheme and their willingness to participate in the management of the irrigation schemes.

1.6 SCOPE AND LIMITATIONS OF THE STUDY

The irrigation schemes being developed in the country are of three types, i.e. small scale, medium and large scale. Small scale irrigation schemes are those with the capacity of irrigating less than 200 ha; medium scale irrigation schemes are those with the capacity of irrigating a land size between 200 and 3000 ha and large scale irrigation schemes are those with a capacity of irrigating more than 3000 ha of land. While the mandate of developing medium and large scale irrigation schemes is given to the central government, the mandate of developing small scale irrigation schemes is given to regional governments.

However, the scope of this study is limited only to large scale irrigation schemes meant for rural farmers. Besides, this study focuses on the participation of beneficiary farmers on the management, operation and maintenance of large scale irrigation schemes.

This study is conducted on the first and the only large scale irrigation scheme that has developed for small farmers though a number of similar irrigation projects are under construction. Thus,

Of course, it is important to note that there are several limitations regarding both the research design and the implementation in the following aspects that would more or less affect the validity of the research. The limitations and the needed improvements are listed as follows:

- Due to farmers' suspicious and pessimistic outlook for questions/suggestions presented by external body, they are reluctant and less willing to give actual data regarding their land size, livestock number, yield, income, etc. Due to financial constraints and subsequent very limited days of field survey, no effort was made to cross- check the truthiness/accuracy of these data using different techniques, like group focus discussion, informal interview, etc.

- Due to the absence of log book/data-base regarding farmers' land size, land location, etc., it was not possible to select respondents equitably based on their farm land size as it had been planned.

- There is a great variation in the length of periods they start benefiting from the irrigation scheme. Farmers at the mouth end of the irrigation system have been benefiting from the scheme since the last three years while farmers at the tail end of the irrigation system became beneficiary of the scheme only since the last six months. This variation is due to the time variation in completion of tertiary and quaternary canals. Thus, treating equally and uniformly the data of these different categories of beneficiary groups was the other limitation of the study.

- As this research was done in a single irrigation project only, the findings, conclusions and recommendation made in this study may not be equally relevant and applicable in the upcoming new but similar irrigation projects.

CHAPTER TWO
REVIEW OF LITERATURES

2.1 REVIEW OF LITERATURES

The rapid increase of irrigated area in the 1970s and 1980s temporarily addressed the food crisis, but left governments with a heavy financial burden for the management, operation and maintenance (MOM) of irrigation schemes. Though money was available for capital works from international development funding agencies (such as the World Bank), many governments have had serious difficulties in providing adequate recurrent funds to sustain I&D systems. In most developing countries, irrigation development projects and their operation and management are heavily dominated by the public sector. Conventional wisdom has assumed that only the State was capable of handling large modern projects requiring heavy capital investment, complicated technical inputs, the legal mandate to distribute water and collect fees. Recent experience challenges these assumptions. Government-operated irrigation systems are often poorly maintained with steadily deteriorating infrastructure.

In addition operation of the system by government agencies has, in many cases, been poor, with operation and maintenance (O&M) staff poorly paid and poorly motivated. As a consequence of the failure to adequately operate and maintain them, the irrigation systems have fallen into disrepair, leaving many farmers with unreliable, inadequate and untimely supplies of irrigation water.

Agricultural production and rural livelihoods have suffered, and the contribution to the national economy has declined.

Over the past three decades, the world's net irrigated area has increased by 73 percent, from 150 million ha in 1965 to 260 million ha in 1995 (FAO, 1998, quoted by Gonzalez, 2001). However, during the same period, the irrigation sector has been increasingly exposed to new challenges and changing driving forces, i.e. competing demands for water, emerging environmental issues, persistent and even pervasive food insecurity and poverty(Sylvain PERRET and Emilie TOUCHAIN**,**2002)

With regards to operation, management and performance of large-scale irrigation schemes in Africa, FAO (1987: 56) identified the following special weaknesses:

- Over sizing government and administrations, leading to excessive recurrent costs;
- lack of management and technical skills;
- lack of consistent policy and failure to plan for the medium and long term;
- political interference in technical and economic decision making and failure to delegate authority as well as responsibility;
- lack of foreign exchange for such essentials as fuel, spare parts and replacement machinery;

- Failure to give adequate return to farmers, leading to their abandoning the schemes."

To reverse this abysmal condition of irrigation schemes, especially the medium and large scale irrigation schemes owned and run by governments, efforts were made by the governments of different countries and International Institutions. Among these efforts, the institutional reforms introduced in the eighties by financing/donor agencies like the World Bank and Asian Development Bank was the major one. The institutional reform introduced by these agencies is known as "Participatory Irrigation Management" (PIM).

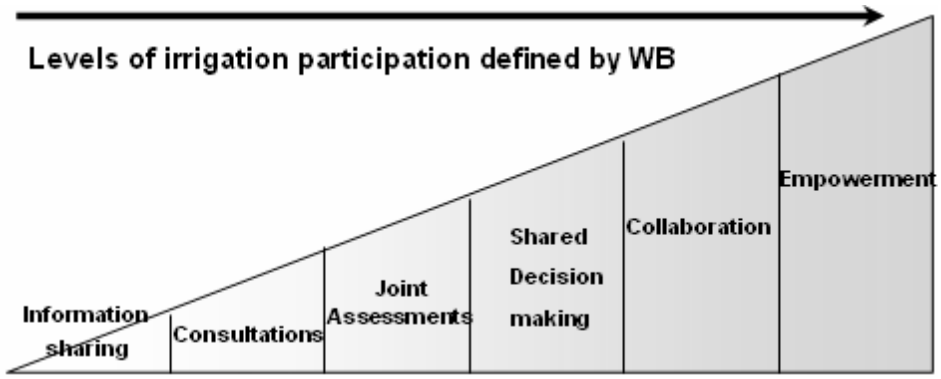
The term 'irrigation management transfer' (IMT) is defined by FAO (1999) as: … the relocation of responsibility and authority for irrigation management from government agencies to non-governmental organisations, such as water users associations. It may include all or partial transfer of management functions. It may include full or only partial authority. It may be implemented at sub-system levels, such as distributary canal commands, or for entire systems or tube well commands.

This process, the so-called Irrigation Management Transfer (IMT), includes state withdrawal, promotion of the participation of water users, development of local management institutions, transfer of ownership and management, and so on. A number of successes as well as failures have been already reported and analyzed (FAO, 2001).

Nevertheless, transferring substantial management authority to a locally-based organization is a complicated undertaking and may involve changes in national policy, regulations and organizational structure, creation of new organizations at the local level, transference of equipment ownership, and changes in personnel, in addition to the shifting of management functions to the new managers (Hamdy A., 2004)

Participation is defined as a process through which stakeholders' influence and share control of development initiatives and of decisions and resources that affect them (ADB, 2012) and PIM approach is expected to deliver a number of positive outcomes and impacts like empowering farmers, better system maintenance and service, reducing cost of irrigation to the government, and higher water productivity and profitable agriculture.

According to WB, various levels of participation can be grouped in terms of the degree of involvement and influence (see Figure 1).



Information Sharing	• Transition into local languages and dissemination of written material using various media • Informational presentations and public meetings
Consultation	• Meetings • Field visits and interviews
Joint Assessment	• Participatory assessments and evaluations • Beneficiary assessments
Shared Decision-making	• Participatory planning • Workshops and seminars to determine positions, priorities, roles • Meetings to resolve conflicts, seek agreements, engender ownership • Public reviews of draft documents

Collaboration	• Formation of joint agency/stakeholder committees/task forces • Joint work with user groups, NGOs, or other stakeholder groups • Stakeholder groups given principal responsibility for implementation
Empowerment	• Capacity building of stakeholder organisations • Hand-over and self-management by stakeholders • Support for new, spontaneous initiatives by stakeholders

Figure 1: Levels of Participation In Irrigation Management Defined By WB

Participatory Irrigation Management (PIM) was seen as an instrument to solve problems associated with the irrigation sector and PIM started in the late 1980s with following objectives (FAO, 2007):

- Reduce the recurrent government expenditure on O&M by replacing financially self-reliant water service provider.
- Reverse the increasing rate of deterioration of irrigation infrastructure.
- Provide transparency in management and accountability of the service from provider to water user.

(V. Ratna Reddy P. Prudhvikar Reddy) Judicious management of water resources is among the critical policy issues across the continents. The need for action in this direction is growing, as countries and communities across the globe are increasingly experiencing water stress. The growing water stress represents culmination of gross neglect and miss-management of water resources over the years. For, the problem is not due to absolute shortage of water, but due to the absence of proper mechanisms for conservation, distribution and efficient use.

Realising the importance, irrigation development policy has undergone changes across the globe during the last ten years. As Meinzen-Dick, et. al. (1997), point out that the earlier approaches to irrigation development were based on the assumption that a combination of "correct" technology, "efficient" markets, and "capable" agencies (government departments) would yield best possible

results. These approaches were found ineffective in the absence of decentralization and devolution of powers to the users. It is now widely recognized that appropriate institutional arrangements involving farmers and other stakeholders is critical for sustainable water resource management.

Van Vuren (1998) analyzed four different angles to answer the question "why participation in water management?" According to a decentralization perspective, PIM can help to diminish the role of governments, to liberalize the economy, to let more economic room for individual and democratic principals in governance. Also a reason for the government to adopt this new form of farmer participation is the influence the donors have, by making it a prerequisite for financial support in system rehabilitation. According to a financial perspective, PIM is believed to have a positive influence on cost recovery in irrigation systems (farmers will be more motivated to pay fees, staff reduction, lower salaries, better supervision of staff, etc.). Indeed, "an important reason for governments to establish water users associations now is to reduce costs and increase fee income" (Vermillion, 1995). According to an infrastructural perspective, PIM can avoid destruction of the infrastructure by farmers, enable a quick response to system breakdown reducing maintenance costs, reduce water theft, promote a better maintenance, etc. Finally, to a societal perspective, PIM can help to create the feeling of ownership, stimulate self-development and a democratic society, achieve more efficient management, etc.

Since, 1980s implementation of PIM globally from Mexico to Nepal has been largely identified as having worked, i.e. having resolved the problems of the irrigation sector. Many success stories were written about PIM projects, and there were not just recommendations to replicate PIM, irrigation financing was tied to PIM conditionality. Major financing institutions, like World Bank (WB), Asian Development Bank (ADB), as well as some major donors laid down a prerequisite condition to implement PIM, as a means to financing irrigation projects. This shows that in many countries the tight financial situation of governments has been important for introducing PIM/IMT. This was believed to achieve a "reform of the irrigation sector", essentially the hand-over of infrastructure and services from irrigation agencies to farmer user groups, known by various names [in different places], such as Water User Associations, Water User Cooperatives, or Cooperative Societies [WUAs, WUCs, WUCSs] (Basavaraj Biradar, 2011/12)

Governments often adopt PIM/IMT programs in order to improve the financial and physical sustainability of irrigation systems (as in Mexico and Chile), to improve water management and agricultural productivity (as in Andhra Pradesh in India), and to cope with constraints on government budgets (as in the Philippines and most other places). Farmers sometimes promote IMT in order to gain control over the irrigation system and improve the water service (as in the Columbia Basin, USA, Australia). Or they may put pressure on the government to take over management of irrigation systems in order to gain control over use of irrigation service fees and stop irrigation expenditures from

rising (as in the Coello and Saldana systems in Colombia and the Dominican Republic) (FAO, 1999).

Vermillion (1996) observed that farmer management of public irrigation systems would enhance their performance and bring about wide-ranging socio-economic changes that would enable farmers to substantially improve farm income besides improving cost effectiveness of operation and maintenance. Though global experience with irrigation management transfer is far from uniform, especially in low-income societies, it has shown some success in countries like Philippines, Mexico, Chile, Australia, etc. (Saleth and Dinar, 2004).

The management transfer from the State to Water Users Associations (WUAs) has been more successfully achieved in some places (Mexico, Colombia and Turkey), than in other places (India, Pakistan, Philippines). Literature provides explanations as success factors for PIM/IMT like relative strength of economy and central government, higher literacy and standard of living (G van Vuren et. al. 2004)

Participatory Irrigation Management system is preferred since it is felt that the users have a stronger incentive to manage water more productively, and can respond more quickly to management problems in the system, particularly at the farm level (Brewer J. et.al. 1999, Grocenfeldt and Svendsen, 1997, Subramanian et al. 1997). Moreover transferring responsibilities has also come to be seen as a way to reduce pressures on thinly stretched government

finances, while at the same time improving irrigated agricultural production and ensuring the long term sustainability of irrigation systems (Geijer et al 1996, Vermillion 1991, Mitra 1992). The intention is also to encourage efforts by individuals to take responsibility for the management of the resource, in the belief that individuals have greater stake and better information for making efficient resource allocations (Brewer et al 1997).

Therefore, PIM or the user participation in the management of irrigation systems typically seeks to address the following objectives:

1. Improve efficiency of irrigation systems
2. Ensure sustainability of irrigation systems
3. Improve performance of irrigated agriculture
4. Reduce pressure on government finances
5. Permit farmers to play a greater role, which is a major shift away from conventional government policy.

2.2 DESCRIPTION OF THE STUDY AREA

The Koga Irrigation Project is the first attempt by the Government of Ethiopia to develop a large-scale irrigation scheme for rural farmers. It is with the support of the Ethiopian government and the African Development Fund that the construction of Koga Irrigation Infrastructures was made so as to irrigate 7000 hectares of land. This Irrigation Scheme has a main dam of 21.5 meters

height with a capacity of impounding 77 million cubic meters, out which 73.4 MCM is useable volume and 3.7 MCM for sediment deposition for project life of 50 years. The dam is zoned earth and rock-fill construction with near vertical impervious core flanked by a suitable filter, transition and shell. The project has concrete lined main and secondary canals of 16.7 km and 78km length respectively; and tertiary and quaternary earth canals with lengths of 120 km and 310 km respectively.

The Koga Irrigation Project is situated in the geographic location of latitudes of $11^0$10' to $11^0$25' North and Longitudes of 37^0 02' to 37^0 17' East. Administratively it is located in the Mecha woreda of west Gojam Zone, Amhara Regional State. The land Elevation of the project area varies from 1800 meter above sea level at the mouth of the Koga River to approximately 3200 m above sea level at its highest point on the Koga watershed divide. The Koga River is a major tributary of the Gilgel Abay which flows northwest off the flanks of Mt. Adama into Lake Tana.

Rainfall is of the monsoon type with a mean annual rainfall of 1400mm with an 80% probability of at least 1245mm. Most of the rainfall comes during July - September, thus permitting one season rain fed cropping only. Based on the climatic zones classification, the catchment falls within the Woina Dega and Dega zones. The majority of the catchment area lies within the Woina Dega zone and is characterized by distinct dry and wet seasons. The dry season

occurs between November and April and the wet season between May and October; “small rains” occur sporadically during April and May.

Out of the total irrigation command area, i.e.7000 ha, only 1000 ha is located within the Koga River watershed. The remaining 6000 ha is found outside the watershed boundary in the northern direction.

According to 2007 census, the total number of population in the seven Kebeles’ of the command area was 57,155 and the expected annual population growth rate is nearly 3%. Average family size is 6.6 persons. The population density in the catchment varies considerably, from 44 persons per km2 in the upper catchment to 300 persons per km2 on the downstream part. This shows the very high pressure on the natural resources. The population in each kebeles of the command area is presented in the table below.

Table 2: Population Data of the Command Area’s Kebele

S.N	Kebeles’ Name	Total # of ‘Gots’	# of ‘Gots’ in the command area	Total population		
				Male	Female	Total
1	Kudmi	8	6	4245	4019	8264
2	Ambo Mesk	11	6	3423	3365	6842
3	Inguti	8	8	2904	2176	5080
4	Amarit	14	6	9437	1514	10950
5	Andinet	8	4	7646	6933	14582
6	Tagel Wedefit	16	8	3298	3217	6515
7	Inamirt	8	1	2519	2403	4922
	Total	**73**	**39**	**33475**	**23627**	**57155**

Source: Woreda Agricultural and Rural Development Office

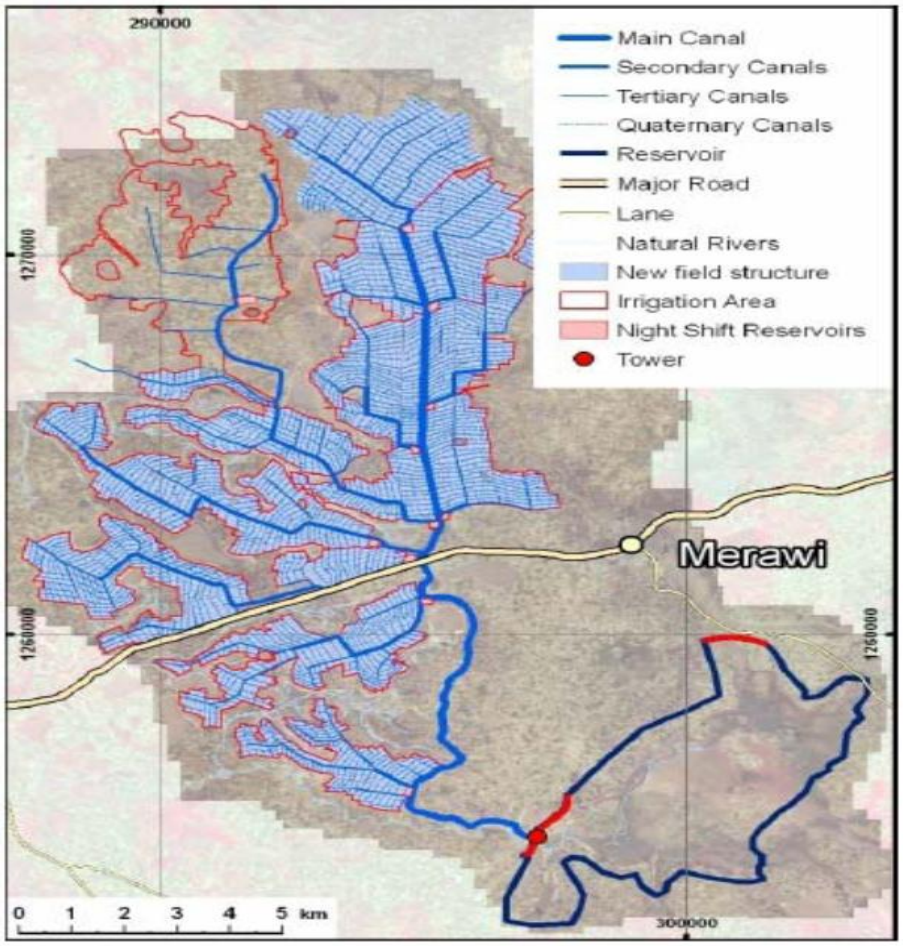


Figure 2: Overview of Project

Figure 3: Location of Koga Irrigation Project

The total numbers of households who have agricultural land within the command area are about 10,000. Average land holding size, as estimated in 2007, was about 2.1 ha for those who did not use irrigation yet and 1.68 ha for those who did use irrigation. However, the majority of beneficiary households (about 51%) had only between 0.25 and 1 ha.

Agriculture is the main stay of livelihood in the study watersheds. Crop and livestock production are fully integrated and thus the production system can be referred as crop-livestock mixed system. Livestock play an increasingly important role in household budget and coping strategies during times of drought. Livestock provide meat, milk, energy. Manure fulfills important role through nutrient cycling between and within farms, which enables the continued use of smallholder farms.

The estimated livestock resource in the Project area is 64,779 Tropical Livestock Units (TLU), most of this is made up of cattle. The average number of livestock in the household is 4.2 cattle, 0.3 sheep, 0.3 goats, 0.5 equines, and 3.3 poultry. Despite large numbers of livestock in the study area, their productivity is much lower than their potential due to poor nutrition and health problems.

Approximately half of the Koga catchment is estimated to be cultivated. About 30 percent of the land is used for grazing and forestry activities (Eucalyptus plantations), the remaining 20 percent is considered too degraded to be used productively. The soils in the upper catchment, with the exception of the very

shallow Leptosols, have reasonable agricultural potential if conservation based agriculture is applied. The main risk of these soils is their sensitivity to erosion. Over 90% of the command area, in the downstream part of the catchment, is covered by Haplic Alisols, which are suitable for irrigation. The remaining soils, Vertisols and Gleysols, are constrained by poor drainage.

Most of the study area is intensively farmed with no trace of the original flora and fauna. The most important environmental problems observed in the area are soil erosion, deforestation, poor land use and management.

The major types of crops grown on the irrigated land along with their cropping seasons are shown in the table below.

Table 3: Major Types of Crops Grown within the Command Areas of the Irrigation Project

S n	Types of Crop Grown in Each Cropping Seasons		
	1st cropping season (Rain Season)	2nd cropping season (Dry Season)	3rd cropping season (Dry Season)
	Cereals	**Cereals**	
	• Maize	• Wheat	
	• Teff	• Barley	
	• Millet	• Maize	
	• Barley	**Pulse crops**	
		• Pea	
		• Soya bean	
		Vegetables	
		• Potato	
		• Cabbage	
		• Tomato	
		• Onion	
		• Garlic	
		• Carrot	

Source: Koga Irrigation Project Office

CHAPTER THREE

DESIGN OF THE STUDY

3.1 RESEARCH METHOD

The aim of this research was to determine the status or to describe the status of beneficiary farmers' participation in the management of large scale irrigation scheme which has been developed for their use. To achieve the desired objectives and also to justify the hypothesis stated in this study, thus, it was a descriptive, specifically a Survey Descriptive Research method that was employed in this research.

3.1.1 Variables:

A- Dependent Variable

In this study the dependent variable was *participation of beneficiary farmers in the management of irrigation schemes.* The indicator parameters for participation were the extent of participation, attitudes/willingness towards participation, formation of users' organisation/ association, etc.; and the performance output indicators are equitable water distribution, minimal conflict among water users, clean and well maintained irrigation canals, etc.

B- Independent Variables

The following potential intervening variables, which were hypothesized to influence beneficiary's participation in the management of irrigation scheme, were selected based on the findings of past studies, existing theoretical

explanations, and the authors' knowledge of the farming systems of the study area. The identified independent variable which affect participation of beneficiary farmers in the management of irrigation systems are:

- *Information, training and visit*: Information, training and visiting has big role in awareness creation about improved land and water management practice. It increases farmers' willingness to participate in the management, operation and maintenance of irrigation systems.

- *Formation of Water Users Association:* as experiences of different countries have indicated it was the government institution that has to take the responsibility and the initiative to organize the beneficiary farmers to form Water Users Association. Hence, the efforts made by these responsible institutions and the presence of legal provisions for the establishment of Water Users Association influence the participation of beneficiary farmers in the management of large scale irrigation schemes.

- *Regular support and follow-up*: Regular and continuous technical, information, material, etc. support given by concerned institutions determine the extent and effectiveness of beneficiary farmers' participation. Institutions are critical for farmers' decision in interventions. They create an environment and incentives that can either enable or undermine their efforts (e.g. Asrat et al., 2003)

- *Educational status of head of household*: It was hypothesized that the educational level of the household head has a direct and positive correlation with the extent and attitude of participation in the management of the irrigation scheme. The education level of the respondent household head was categorized into three groups as illiterate, non-formal education and formal education. Farmers' ability to acquire, process and use information could be increased by education.

- *Age of the household head*: there was an assumption that age affects the extent at which a person could understand, accept and apply new ideas and new methods of doing things. The younger is the household head the higher would be the acceptability and applicability of new ideas or working techniques. Thus, this variable was represented as: < 30 yrs. Old, 30 – 50 yrs. Old, and > 50 yrs. Old. Featherstone and Goodwin (1993) suggested that age greatly matters in any occupation and it generates or erodes confidence. Therefore, in this study it was hypothesized that age has a negative influence on the willingness to participate on improved land and water conservation activity

- *Female headed household*: It was considered that female headed households would have great participation as they consider their farming land as the most secured means of their livelihood and they also consider WUA as an effective means that ensure their equal benefit from the irrigation scheme.

- *Size of Land own*: Based on the author experience, farmers who have small land size would participate in all activities that have a positive impact on agricultural productivity and sustainable use of their limited land size. Thus, it was hypothesized that beneficiary farmers with small land size would participate more on the management of the irrigation scheme. Farmers were classified into three groups based on their land size as: who have ≤0.75 ha, between 0.75 and 1.50 ha, and > 1.5 ha.

- *Off farm economic activity*: It was assumed that farmers who engaged in off farm economic activity and the income contribution of this activity for the total family income exceeds that of the agriculture, the extent and attitude of their participation is minimal.

- *Renter/sharecroppers*: It was assumed that farmers who earn income from their land rent and /or who give their land for sharecroppers would have less interest and attitude to participate in the management of irrigation schemes. However, if this happened due to lack of resource like ox to plough land, money to buy seed/ fertilizer, etc., however, the assumption stated here may be different.

- *Satisfaction on yields of irrigation agriculture*: It was hypothesized that if farmers are satisfied with the yield they harvest from their irrigated land, the extent and attitude of participation in the management of irrigation scheme will increase positively.

3.2 SAMPLING

Stratified random sampling method was the selected sampling method to suitably address the objectives of the study. Thus, for selection of the required sample size, first the beneficiary population was divided into sub-population based on their geographic location, i.e., Irrigation Blocks. Next, 10 households were selected randomly from each irrigation blocks. Thus, a total of 120 sample beneficiary farmers were selected from the total population size of about 10,200 beneficiary households from the twelve irrigation blocks.

For the purpose of collecting data from functionaries of the responsible government institutions, however, non-probability sampling method of purposive sampling were applied.

3.3 TOOLS AND METHODS OF DATA COLLECTION

This study made use of both primary data collected from beneficiary farmers' household surveys and functionaries of concerned governmental institutions; and data from various secondary sources.

Secondary information that could supplement the primary data was collected from published and unpublished documents obtained from different governmental and non-governmental organizations.

In order to collect primary data relevant to the objectives of the study, a 'structured interview' data collection tool were employed. The structured interview was containing both close-ended and open-ended questions. The

design and structure of the interview was 'individual interview'. However, 'group interview' was also used while PA leaders were interviewed.

Prior to administering the questionnaire survey, two major steps were taken to improve the quality of the data. The first step was revision and repeated pre-testing of the draft questionnaire based on the responses. Feedback from the pre-test was used further to standardize and finalized the questionnaire. Second, separate interviews were held for functionaries of government institutions involved in Koga Irrigation Project and for the irrigation beneficiary households. Finally, face to face interviews (guided by the questionnaire) were administered to irrigation beneficiary households (the head of the household was the respondent) and functionaries of concerned government institutions.

For sample household survey, 12 enumerators and one supervisor were employed. The enumerators for the data collection were selected on the basis of their educational background and their knowledge of the rural socio-economic milieu. Prior to the launching of the survey, enumerators and the supervisor were briefed for one day about the survey and to familiarize them with the questionnaire. For ease of understanding, the questionnaire was also translated into the local language.

Besides interview, field visit was done to collect data like up-keeping of irrigation structures, efficiency of irrigation water utilization, feeling and attitude of beneficiary farmers, etc.

3.4 DATA PROCESSING

The completed structured interview was scrutinized, verified, edited and arranged serially. Then, code book had been prepared to each responses of the question and these coded data were transferred to master chart prior to entering the data directly to computer. Finally, the data were processed on computer. For processing data collected from responsible institutions, code book and master chart were also prepared in the same manner. However, qualitative data for open ended questionnaire were processed in a different way.

3.5 DATA ANALYSIS

Here, the processed data were first tabulated and organised in a systematic order and also in accordance with the objectives and the hypothesis of the study. Next, this tabulated and organised data were analyzed statistically. The method of statistical analysis adopted for the study was a Descriptive Statistical Analysis Method. This descriptive analysis was performed using frequencies, means, percentages, etc.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF DATA

4.1 DESCRIPTION OF SAMPLE HOUSEHOLDS' CHARACTERISTICS

Here, data which describe the characteristics/background of the sample households like gender, age, family size, etc., were analyzed. The result of this analysis is described in the table below.

Table 4: Description of the Sample Beneficiary Households Characteristics

S.N	Variables	Frequency	%	Mean
1	**Gender**			
	• Male	114	95	
	• Female	6	5	
2	**Age**	**0**		46
	• ≤ 30 years	19	16	
	• 31-50 years	73	61	
	• > 50 years	28	23	
3	**Family Size**			**5**
	• ≤ 3	18	15	
	• 4-6	82	68	
	• ≥ 7	20	17	
4	**Irrigable Land Holding Size**			**1.12**
	• ≤ 0.75 ha	29	24	
	• 0.75 – 1.5 ha	69	58	
	• < 1.5 ha	22	18	
5	**Rain fed land holding size**			**0.67**
	• None	111	92	
	• ≤ 0.75ha	7	6	
	• > 0.75 & <1.5 ha	2	2	
	• ≥1.5ha			
6	**Education Level**			
	• Illiterate	30	25.0	
	• Non-formal education	47	39.2	
	• Formal education	43	35.8	
7	**Number of livestock**			**3.55**
	• ≤ 2	30	25	
	• 3 – 5	72	60	
	• > 5	18	15	
8	**HH with member's engaged in off farm activity**	28	23	
9	**Type of House**			
	• Grass roofed	13	11	
	• CIS roofed	107	89	
10	**experience in irrigation farming**			**2.67**
	• ≤ 1 years	30	25	
	• 3 years	50	41.7	
	• 4 years	40	33.3	

Source: Field Survey

4.2 EXTENT OF BENEFICIARY FARMERS' PARTICIPATION IN THE MOM OF LSIS

The extent at which beneficiary farmers were participating in the MOM of the irrigation scheme was analyzed and the result of this analysis is presented in the table below.

Table 5: Beneficiary Farmers Response on the Extent of Their Participation in MOM of the Irrigation Scheme

S.N	Questions Presented To Sample House Hold Head	Number Of Respondents	Percentage
1	**Do you participate in the planning of water distribution schedule?**		
	Yes	120	100
	No		
2	**If No, why?**		
	I am not invited	120	100
	I wouldn't make a difference		
	The place and time is not conducive		
3	**If No, who do you think is making the decision?**		
	The Irrigation Project Office	81	67.5
	Leaders of the cooperative association	17	14.17
	I do not know	22	18.33
4	**Do you participate in the planning of water fee payment and collection?**		
	Yes		
	No	120	100
5	**If No, why?**		
	I am not invited	120	100
	I wouldn't make a difference		
	The place and time is not conducive		
6	**If No, who do you think is making the decision?**		
	The Irrigation Project office	53	44.2
	Leaders of the cooperative association	22	18.3
	The District ARD office	13	10.8
	I don't know	32	26.7
7	**Do you participate in the planning of irrigation canal maintenance**		

	Yes	16	13.3
	No	104	86.7
8	**If No, why?**		
	I am not invited	82	78.8
	I wouldn't make a difference	13	12.5
	The place and time is not conducive		
	I have no reason	9	8.7
9	**If No, who do you think is making the decision?**		
	The Irrigation Project Office	24	23.0
	Leaders of the cooperative associations	35	33.7
	The PA leaders	18	17.3
	I do not know	27	26.0
10	**How often over distribution and use of water conflicts happened?**		
	Most of the times	29	24.2
	Sometimes	56	46.6
	Rarely	35	29.2
11	**Who do you think is resolving conflicts among water users?**		
	Irrigation project office	33	27.5
	Leaders of the Cooperative Associations	54	45.0
	The PA leaders	28	23.3
	The village people	5	4.2
	other		
12	**Do you participate in the maintenance of irrigation canals**		
	Yes	103	85.8
	No	17	14.2
13	**If Yes, how**		
	Money		
	labour	103	
14	**If No, why**		
	I am weak and old	15	88.2
	I am living in the upper catchment far from my irrigable land	2	11.8

Source: Field Survey

Performance of the Irrigation Scheme

The performance of the irrigation scheme (i.e. cost, quality, agricultural productivity, and economic return of the irrigation system) is highly depending on the level/extent of beneficiary farmers' participation. Thus, to evaluate the extent of beneficiaries' participation, two performance indicators (i.e. quality of the irrigation system and agricultural production) were analyzed. The results of these analyses are presented as follow.

1) Quality of the Irrigation System

Adequacy, fairness, timeliness of water distribution and frequency of conflicts were the selected indicators to evaluate the quality of irrigation system, which in turn tells us the extent of beneficiaries' participation. The following table shows the collected and analyzed data on the quality of the irrigation system.

Table 6: Beneficiary Farmers Response on the Quality of the Irrigation Scheme

No.	Description	Frequency	Percent
1	Is the quantity of water distributed matches with the required amount		
	Yes	76	63.3
	No	44	36.7
2	If No, what do you think the reason?		
	• Improper planning	25	56.8
	• Design problem	19	43.2
	•		
3	Is it fair the schedule and distribution of water?		
	Yes	55	45.3
	No	43	35.8
	No idea	22	18.3
4	If No, what are the problems?		
	It doesn't consider the crop type	19	44.2
	It favour to large land holders more	16	37.2
	It favour more to certain social groups	8	18.6
5	Is the water distributed reaches and leave the farm land on time?		
	Yes	76	63.3
	No	44	36.7
6	If No, what are the reasons?		
	Some are utilizing above the permitted amount and time	14	31.8
	Design problem of the structures	21	47.7
	The problem of land leveling	9	20.5
7	How often conflicts among water users happened?		
	Most of the times	29	24.2
	Some times	56	46.6
	Rarely	35	29.2

Source: Field Survey

2) Agricultural Production

Agricultural yield, cropping pattern, cropping intensity and irrigated land under cultivation are agricultural indicators of the performance of irrigation system. The analysis of these agricultural production indicators are presented as follow.

Table7: Average Yield of Crops Grown in Rain fed And Irrigation Agriculture

S.N	Crop types	Yield (Quintal per hectare)	
		Rain fed agriculture	Irrigation agriculture
1	Maize	50	52
2	Millet	30	30
3	Barley	16	18
4	Teff	14	14

Table 8: New Crop Types Cultivated in Irrigated Land

S.N	**Crop Types**	**Order of Rank (based on their area coverage)**
1	Wheat	1st
2	Pea	7th
3	Soya bean	8th
4	Potato	2nd
5	Cabbage	5th
6	Tomato	6th
7	Onion	3rd
8	Garlic	4th
9	Carrot	9th
10	Key ser	10th

Table 9: Size of Cultivated Irrigated Land Put

S.N	Cropping Season	Cultivated Area (Ha)	Percentage from the total command area
1	1st Cropping Season	5944	85%
2	2nd Cropping Season	60	0.86%

4.3 WILLINGNESS OF BENEFICIARY FARMERS TO PARTICIPATE IN THE MOM OF LARGE SCALE IRRIGATION SCHEMES

It was hypothesized that the beneficiary farmers' willingness to participate in the management, operation and maintenance of large scale irrigation schemes is influenced by variables like farmers' age, educational level, engagement on off-farm economic activities, wealth status, years of irrigation experience, etc. The effect of these variables on the willingness of farmers to participate in the MOM of irrigation schemes is analyzed and presented in the table below.

Table 10: Descriptive Result of Selected Variables on the farmers' willingness to participate in the MOM of large scale irrigation schemes

Description of variables		Willingness of farmers to participate in MOM activities							
		Planning of water distribution		Payment of water fee		Maintenance of canal		Conflict resolving	
		Yes	No	Yes	No	Yes	No	Yes	No
Age	≤30	14(73.7)	5(26.3)	16 (84.2)	3 (15.8)	17 (89.5)	2 (10.5)	19 (100)	
	31-50	40(54.8)	33(45.2)	45 (61.6)	28 (38.4)	58 (79.4)	15 (10.6)	62 (85)	11 (15)
	.>50	10(35.7)	18(64.3)	12 (43.0)	16 (57.0)	22 (78.6)	6 (11.4)	21 (75)	7 (25)
Education	Illiterate	7 (23.3)	23 (76.7)	12 (40.0)	18 (60.0)	20 (66.7)	10 (33.3)	22 (73.3)	8 (26.7)
	Non formal	28 (59.6)	19 (40.4)	31(66.0)	16 (34.0)	38 (80.8)	9 19.2)	41 (87.2)	6 (12.8)
	Formal	29(67.4)	14 (32.6)	30 (69.8)	13 (30.2)	39 (90.7)	4 (9.3)	39 (90.7)	4 (9.3)
Off farm income activities	engaged	21 (75)	7 (25)	22 (78.6)	6 (11.4)	19 (67.8)	9 (32.2)	24 (85.7)	4 (14.3)
	Not engaged	43 (46.8)	49 (53.2)	51(55.4)	41(44.6)	78 (84.8)	14 (15.2)	78 (84.8)	14 (15.2)
Wealth status	High	9 (81.8)	2(18.2)	10 (91)	1(9)	10 (91)	1(9)	11(100)	
	Medium	43 (51.8)	40 (48.2)	53 (63.8)	30 (36.2)	69 (83)	14 (17)	71(85.5)	12 (14.5)
	Low	12 (46.2)	14 (53.8)	10(38.5)	16 (61.5)	18 (69.2)	8 (30.8)	20 (77)	6 (23)
Years of Experience in irrigation farming	1 years	5 (16.7)	25 (83.3)	5 (16.7)	25(83.3)	15 (50.0)	15 (50.0)	19 (63.3)	11 (36.7)
	3 years	29 (58.0)	21(42.0)	33 (66.0)	17 (34.0)	44 (88.0)	6 (12.0)	45 (90.0)	5 (10.0)
	4 years	30 (75.0)	10 (25.0)	35 (87.5)	5 (12.5)	38 (95.0)	2 (5.0)	38 (95.0)	2 (5.0)

Source: Field Survey

Note: Figures in parenthesis shows the percentage

4.4 EXTENT OF INSTITUTIONAL SUPPORT SERVICES

It was hypothesized that training/education, agricultural input and market support services given by the concerned institutions influence the knowledge base, skill, productivity and economic benefit of farmers, which in turn influence the perception and participation of farmers in the management of irrigation schemes. Therefore, the extent of support services which had been given to irrigation beneficiary farmers' of the study area has been analyzed.

1) Training/Capacity Building

Capacity development and training on basic management and technical know-how is an important support service which determines beneficiaries' participation and subsequent sustainability and efficiency of the irrigation system.

Table 11: Beneficiaries' Response on Capacity Building Support

	Number and Percentage of Respondents	
	Number	Percent
Have you been given training/education which enhance your technical know-how		
Yes	32	27
No	88	73
Have you been given training/education on the importance of WUA		
Yes		
No	120	100
Have you been told that water is an economic good for which you will pay		
Yes	107	89
No	13	11

2) Provisions of Agricultural Inputs

Owning to the availability of secured water, farmers tend to use agricultural inputs to increase their agricultural yield. So, adequate and timely supply of agricultural inputs that satisfy the growing demand of the farmers is necessary. This is because it is one of the factors that affect farmers' expectations and perception to the irrigation scheme.

Table 12: Responses On Timely Supply Of Agricultural Inputs

		Number of respondents	
		Count	percentage
1	Very Good6	7	5.8
2	Good 45	54	45
3	Poor 49	59	49.2

Table13: Responses On Adequate Supply Of Agricultural Inputs

		Beneficiaries' response	
		Frequency	Percentage
1	Very Good	7	5.8
2	Good	54	45
3	Poor	59	49.2

3) Market Support

Agricultural production/productivity increment would be meaningful and sustainable only if there is enough/assured market that absorbs the surplus production.

Table 14: Beneficiary Farmers' Response on the Extent of Market Support

		Number of Respondents	
		Frequency	percent
1	**Is there a market problem?**		
	Yes	108	90
	No	12	10
2	**If Yes, how do you describe the extent of the problem?**		
	Extremely serious	22	20.4
	Serious	68	63.0
	Less serious	18	16.6
3	**Were there practical efforts done by responsible institutions to mitigate the market problem?**		
	Yes	32	29.6
	No	76	70.4
4	**If Yes, were they effective?**		
	Yes	11	34.4
	No	21	65.6

CHAPTER FIVE

MAIN FINDINGS AND DISCUSSIONS

5.1 CHARACTERISTICS OF IRRIGATION BENEFICIARY HOUSEHOLDS

The female headed households account 5% of the total household heads. The age of the household heads in the sample ranges between 20 to 76 years; and the percentage of household heads' age in the age groups of < 30 years, 30-50 years and >50 years are 16%, 61% and 23% respectively. Majority of the sample households (68%) have a family size between 4 and 6; while 17% and 15% of the sample households have a family size of >6 and <4 respectively.

The irrigable land holding size of the sample households ranges between 0.25ha to 2.5 ha.24% of the sample households have an irrigable land size of 0.75 and below hectares; whereas 58% and 28% of the sample households have irrigable land sizes in the ranges between 0.75 to 1.5 ha and above 1.5 ha, respectively. Out of the total irrigable land size of the sample households (i.e. 117.75 ha), 34.4% of the land (40.5 ha) is owned by 18% of the sample households while 28% of the sample households own only 10.2% (12 ha) of the total irrigable land. Besides, 8% of the sample households have additional rain fed agricultural land. The average rain fed agricultural land owned by these households are 0.5 ha and 1.0 ha for 6% and 2% of the sample households.

The educational status of the sample household heads varies from illiterate to 10^{th} grade graduate. 25 percent of the sample household heads are illiterate,

i.e. they can neither write nor read. 39.2 % of the sample household heads have attended non-formal education and possessed basic education skills. 35.8% of the sample household heads attained formal education.

The number of oxen owned by the sample households varies between 0 and 4, with a mean of 2 oxen. The number of cows in the sample households varies between 1 and 6, with a mean of 3 cows. The number of goat and/or sheep of the households range between 2 and 12, with a mean of 5 sheep and/or goats. 22% of the respondents have either a horse or mule with cart for transportation.

77 percent of the sample households didn't have even a single family member engaged in other off-farm economic activities. However, 23 % of the sample households had family members of 1 to 4, with a mean of 2 individuals, engaged in off-farm economic activities.

The sample households had varying years of experience in irrigation farming which ranges between 1 and 4 year. 25% of the sample households had an irrigation farming experience of one year; 41.7 % of the respondents had irrigation farming experiences of three years; and 33.3 % of the respondent households had irrigation farming experiences of four years.

13 numbers of sample respondents (11%) had grass roofed houses, while 89 % of sample households (i.e. 107 respondents) had Corrugated Iron Sheet (CIS) roofed houses.

5.2 EXTENT OF BENEFICIARY FARMERS' PARTICIPATIONS IN THE MOM OF PUBLIC LARGE SCALE IRRIGATION SCHEMES

The study has revealed that none of the beneficiary farmers were involved in the planning processes of the irrigation scheme construction, or in planning of irrigation water schedule and distribution, or in the planning of irrigation structures' maintenance, etc. All the sample beneficiary household heads unanimously gave the reason why they didn't participate in the planning processes of each activity as they were not invited to participate in these planning activities by any of the responsible/concerned body.

67.5 % and 14.17 % of the respondents thought the decision on the schedule and distribution of irrigation water were made by the irrigation project office and leaders of the cooperative associations, respectively; and 18.33 % of the sample household heads didn't know who were deciding the schedule and distribution of water.

Regarding participation in the planning of irrigation canal maintenance, 13.3 % of the sample respondents participated while 86.7 % of the respondents didn't participate. "I was not invited", "I don't have reason", and "I wouldn't make a difference" were the reasons given by 78.8 %, 12.5% and 8.7% of the not participated respondents.

Though 86.7% of the sample household heads hadn't participated in the planning of irrigation canal maintenance, 85.8% of the respondents were participating in the maintenance activities of irrigation canals. Only 14.2% (17

household heads) of the sample households didn't participate; and "old age" and "distance of resident location" were the reasons given by 88.2% and 11.8% of these 17 sample households respectively.

Performance of the Irrigation Systems

The extent of beneficiary farmers' participation (both in the quantity and quality) has a direct impact on the performance of the irrigation systems. The performance of irrigation systems is evaluated based on its indicators. The commonly used performance indicators of irrigation systems are *cost of irrigation scheme*, *quality of irrigation system, agricultural production and economic return.* However, I selected two performance indicators of irrigation systems - namely ***quality of irrigation system*** and ***agricultural production***- to evaluate the extent of beneficiaries' participation in the MOM of the public large scale irrigation scheme.

1) Quality of Irrigation System

1.1 Adequacy of Water Distribution

Out of the total 120 sample beneficiary household heads interviewed, 36.7 % or 44 heads of household were respond that the quantity of irrigation water distributed did not match with the quantity of water required/ demanded either based on the area of the land and/or the type of crop grown. On the contrary, 63.3% of the beneficiaries were responding positively, i.e. the quantity of water distributed was matched with the required/demanded water amount.

Table 15: Order of Reasons Why Farmers Do Not Obtain Adequate Water for Irrigation

	Number of Farmers	Percentage of Farmers	Rank of Reasons
Improper planning	20	45.45	1st
Design Problems	16	36.36	2nd
Water Turn Abuses	8	18.18	3rd

The above table shows beneficiaries ranking of problems that constrained the supply of adequate water in a timely fashion. Out of the 44 beneficiary households who responded adequate water was not obtained, 45.45% or 20 beneficiary households had responded that improper planning of water schedule and distribution was the first reason for the observed inadequate water distribution. Likewise, 36.36% (or 16 beneficiary farmers) and 18.18% (or 8 beneficiary farmers) had responded that design problem and water turn abuses were the reasons of the inadequate water distribution respectively. Thus, it is institutional and management problems (improper planning and water turn abuses), which account 28 numbers of beneficiary farmers (or 68.68% of the respondents) more relevant than the technical problem (design problem), which account 36.36% of respondents (or 16 number of beneficiary farmers), for the inadequacy of distributed water.

1.2 Fairness of Water Distribution

Out of the total sample beneficiary farmers, 55 farmers (45.3%) have said that the schedule and distribution of irrigation water is fair; 43 beneficiary farmers (35.8%) have said that the schedule and distribution of irrigation water is unfair; and 22 beneficiary farmers (18.3%) have responded that they don't know whether the schedule and distribution of water were fair or not.

Beneficiary farmers who have said the schedule and distribution of irrigation water is not fair have given the reasons why the schedule and distribution of water was unfair as stated in the table below.

Table 16: Reasons Given For the Unfair Schedule And Distribution of Water

	Number of Farmers	Percentage of Farmers	Rank of Reasons
It doesn't consider crop type	19	44.20	1st
It favors large land owners	16	37.20	2nd
It favor more to mouth end users	8	18.60	3rd

The above table has revealed that out of the 43 beneficiary farmers (35.8% of the total sample beneficiary farmers) who responded the schedule and distribution of water was unfair, 44.2% (19 farmers), 37.2% (16 farmers), and 18.6% (8 farmers) have stated non consideration of crop type, favoring large land owners and mouth end users more as reasons for the unfair scheduling and distribution water respectively.

1.3 Timeliness of Water Distribution

76 beneficiary farmers (63.3% of the total beneficiary sample farmers) have responded that the water distributed was reach and leave the farm land on time. On the contrary, 44 beneficiary farmers (36.7% of the total beneficiary sample farmers) have given their response that the water distributed was not reach and leave the farm land on time. The reasons for the untimely distribution of irrigation water, in their order of rank, are: 1- Design problems of the irrigation structures, 2- The upper beneficiary farmers' utilization of water beyond their permitted amount and time, and 3- The problems of land leveling.

Table 17: Reasons for the Untimeliness of Water Distribution

	Number of Farmers	Percentage of Farmers	Rank of Reasons
Utilization of water beyond the permitted amount and time	14	31.80	2nd
Design problems of the structures	21	47.70	1st
The problem of land leveling	9	20.50	3rd

1.4 Conflicts Over The Use Of Irrigation Water

Water disputes persistently occur between irrigators in the new schemes and upstream traditional irrigators and among irrigators within the irrigation systems. However, the frequency of such dispute occurrence and its management are among the most important things that determine the quality of the irrigation system. 24.2% of the beneficiary sample farmers have described the frequency of water dispute as high (most of the times),

while 46.6% and 29.2% of the interviewed beneficiary farmers respectively stated the occurrence frequency of water disputes as moderate (sometimes) and low (rarely).

2) Agricultural Production

There is a proposition that if beneficiary farmers participate in the MOM, there is an improvement in the quality of irrigation service and distribution of water. This improvement in the quality of irrigation service will motivate farmers to use more inputs which lead to higher yields. Besides yield, improvement in the quality of irrigation service will also increase the crop variety, the cropping intensity, and the size of land cultivated under irrigation.

2.1 Crop Yield

Though crop yield increment was expected from irrigation farming, the data collected at the field level showed that there was no significant difference between the yields of rain fed and irrigation farming.

Table 18: Yield Difference between Rain fed and Irrigation Agriculture

Crop Type	Yield before irrigation (rain fed agriculture)	Yield in irrigation farming	Percent of yield increment
Maize	50	52	4
Millet	30	30	-
Barley	16	18	12.5
Teff	14	14	-

The above table prevailed that there was only 4% yield increment in maize and 12.5% increment in the yield of barley. Besides, there was no any yield increment on crops of millet and teff.

2.2 Cropping Pattern

Subsequent to the introduction of irrigation scheme, there a significant change in the cropping pattern in the irrigated agricultural lands. The beneficiary farmers have commenced cultivation of more than ten additional varieties of commercial crops.

2.3 Cropping Intensity

Practical local experiences and reviewed literatures have witnessed that the introduction of irrigation facility would result in the increment of cropping intensity. Including rainy season farming, cultivating irrigated agricultural land 3 times a year has been a common practice in many areas where irrigation had been introduced. This is mainly because of shift in cultivation from the traditional and subsistent crops to market oriented commercial crops, which mostly have short period of maturity. However, the collected data in the study area has shown that the cropping intensity in the irrigated lands was only twice a year though about 60 ha of lands were cultivated in the 3rd cropping season during the year 2011/12. The major reason for such condition is that the traditional crops grown in the area, which have extended maturity period, are still continue to be cultivated in the irrigated land. This in turn indicates

the inadequacy/lack of the extension support that would have been given to farmers.

2.4 Cultivated Land Size Under Irrigation Farming

The reviewed literatures mentioned that irrigation schemes managed by beneficiary farmers would result in increment of cropped area and irrigated area. However, the data collected in the study area has showed that 1056 ha of lands within the command area did not develop till the time this data were collected. These uncultivated irrigated lands constitute 15.1% of the total command area of the irrigation system. The reasons for these uncultivated irrigated lands along with their respective share of land size are shown in the table below.

Table 19: Reasons Given By Respondents For The Uncultivated Irrigated Lands

	Uncultivated land Size (Ha)	Share % from the total uncultivated land	Rank order
Inadequate water supply	246	23.30	4th
Large land holding beyond the beneficiaries capacity to develop	171	16.19	5th
absence of productive labour force in the household	406	38.45	3rd
Design problem in the irrigation structures	470	44.51	1st
Distance of residential location from the farm site	143	13.54	6th
Migration of the land holders to other areas of the country	24	2.27	7th
Land Reserved for research and investment	416	39.39	2nd

5.3 WILLINGNESS OF BENEFICIARY FARMERS TO PARTICIPATE IN MOM OF LARGE SCALE IRRIGATION SCHEME

As it is shown in Table 10, 70% of the respondents were willing to participate in the planning of water distribution, payment of water fee, maintenance of canals, and resolution of conflicts. The willingness of respondents, however, differs for each of these activities. The percentage of beneficiary farmers willing to participate in the planning of water distribution were 53.3%; willing to pay for water fee were 60.8%; willing to participate in maintenance of canals were 80.8; and willing to participate in conflict resolution were 85.0%.

Determinants of Beneficiary Farmers Willingness to Participate in MOM of LSIS

Here, five determinants variables – *age of the household head, educational status of the household head, engagement in off-farm activities by any members of the household, wealth status of the household* and *irrigation experience of the household*- were analyzed to determine their effect on the beneficiary farmers' willingness to participate in the MOM of irrigation schemes. The specific effects of these variables on beneficiary farmers' willingness to participate are discussed below.

- *Age of the Household Head*: As can be seen in Table 10, the percentage of household heads willing to participate in the MOM were more in the age group < 30 years. The average percentage of farmers willing to participate in the MOM in the age groups of <30, 30-50, and > 50 were

86.9%, 70.2%, and 58.1% respectively. This means the age of the household head has a negative influence on his willingness to participate in the MOM of the irrigation schemes. This is mainly because as the farmers get older they stick more to what they have been doing for long time and their planning horizon gets diminish. This finding is also supported by Featherstone and Goodwin (1993). They suggested that age greatly matters in any occupation and it generates or erodes confidence. As a matter of fact, older farmers are more likely to reject in practicing improved land and water management practices. On the contrary, younger farmers are often expected to take risk due to their longer planning horizon (Tesfaye et al., 2000; Befikadu et al. 2008)..

The other interesting thing is that the participation of farmers regardless of their difference increase in the sequence of planning, water fee payment, maintenance of canals, and resolution of conflicts. This indirectly implies how farmers consider planning of development intervention as the responsibility of other external body.

Educational Level of the Household Head: As the analyzed data on Table 10 indicate, the average percentage of sample beneficiary farmers who are illiterate, non-formal education attended, and formal education attended were 50.8%, 73.4% and 79.6% respectively. The education level variable was significant and had a positive association with farmers' willingness to participate in the MOM of irrigation schemes. Farmers' ability to acquire,

process and use information could be increased by education. Besides, education reflects acquired knowledge of environmental amenities. Thus, this variable positively correlated with farmers' willingness to participate in the MOM. In the reviewed literatures similar results were given as- Farmers' ability to acquire, process and use information could be increased by education. Thus, education has been shown to be positively correlated with farmers WTP and WTC for improved land and water management practices (Tegegne, 1999; Ervin and Ervin, 1982; Noris and Batie, 1987, Pender and Kerr, 1996, Asrat et al., 2004)

The other interesting thing is that the willingness of beneficiary farmers' increases sequentially in planning, water fee payment, maintenance of canals, and resolution of conflicts regardless of their level of educational achievement difference.

Off-farm Income Activities of the Households: Among the sample households, 23% of the households have family members, between 1 and 4, who engaged in either permanent or seasonal off-farm income activities. These households are more willing to participate in the MOM of irrigation systems than the households which don't have even a single family member engaged in off-farm economic activities. As indicated on Table 10, the willingness percentage of households with off-farm income activities were 76.8% while the households' without family members engaged in off-farm economic activities were 68%.

Wealth Status of the Households: According to the society's description of wealth, the sample households were classified into three categories as high, medium and low wealth status. Their respective share from the total sample households were 9.2%, 69.2%, and 21.6%. The analyzed data showed that households belong to high wealth status were more willing to participate in the MOM of the irrigation scheme than that of medium and low wealth status households. The percentage of households willing to participate in the MOM of the irrigation scheme were 91%, 71%, and 57.8% for high wealth status, medium wealth status, and low wealth status households respectively. The underlying reason for such condition was that the high wealth status households were the ones which utilized and benefited most from the available irrigated land resource by investing their capital to fulfill the intensive agricultural input demand of the irrigated land. So, the reason why the wealthiest households were more willing to participate in the MOM of the irrigation scheme is because they were the ones utilized the available resource at best and benefited the most. In other words, the higher the wealth status of the household mean the higher the households' ability to make investment decision, which in turn increase the benefit. Besides, the households with better wealth status are risk bearers to engage in improved technologies which augment the productivity of their land.

Irrigation Experience of the Household Heads: The sample households' experience in irrigation farming varies in the range between 1 to 4 years. 25% of the sample beneficiary households had only one year experience in irrigation farming. On the other hand, 41.7% and 33.3% of the sample households had 3 years and 4 years irrigation farming experiences respectively. As the analyzed data on Table 10 indicate, only 36.7% of the sample beneficiary households who had only one year of irrigation farming experience were willing to participate in the MOM of irrigation scheme. The percentage of beneficiary households willing to participate in the MOM of irrigation scheme were 75.5% and 88.1% for 3 years and 4 years of irrigation farming experiences respectively. This means that the irrigation experience variable had a positive influence on the willingness of the beneficiary farmers to participate in the MOM of the irrigation scheme. The reasons for this positive correlation is that as the farmers experience to irrigation farming increase, their technical know-how and financial capability to cover the costs of agricultural production inputs also increase. These in turn led to increment in agricultural yields. The more the farmer benefited, the more would be his sense of ownership and thus the more would be his participation in the MOM of the irrigation system.

5.4 EXTENT OF INSTITUTIONAL SUPPORT SERVICES

Training and Education: Information and training increases farmers' willingness to practice improved land and water management activities (Pender and Kerr, 1998). In context of this study, this variable refers to farmer participation in the MOM of irrigation scheme. Despite of this fact, only 27% of the beneficiary farmers were responded that they were given technical training. Unanimously, all the beneficiaries responded that they didn't get any training regarding the importance and formation of WUAs. On the contrary, 100% of the beneficiary farmers were aware that they will pay water fee.

Agricultural Input: Owning to the availability of secured water, farmers tend to use agricultural inputs so as to increase their agricultural yield. So, adequate and timely supply of agricultural inputs that satisfy the growing demand of the farmers is necessary. This is because it is one of the factors that affect farmers' sense of ownership and perception to the irrigation scheme. Regarding the adequacy and timely supply of agricultural in puts, as shown on Table 12 and 13, the percentage of beneficiary farmers responded 'very good', 'good', and 'poor' were 5.8%, 45%, and 49.2%, respectively.

Market Support: Agricultural production/productivity increment would be meaningful and sustainable only if there is enough/assured market that absorbs the surplus production. As shown on Table 14, however, 90% of the respondents have said that there was a market problem; and out of these

respondents, 20.4% said the market problem was extremely serious, 63% said the market problem was serious, and only 16.6% said the market problem was less serious. In spite of the presence of serious market problem, no effort was made by any of the responsible institution to mitigate the market problem (as 90% of the sample farmers responded).

5.5 OTHER KEY FINDINGS OF THE SURVEY

From the discussion held with the relevant local and regional government institutions, the following important issues were captured:

- Most of the relevant government institution functionaries, especially at the local level, don't have clear understanding of the WUA's peculiar characteristics, purpose, formation, functioning, importance, etc. Even most of them consider WUAs as synonymous to cooperative associations.
- The country Ethiopia can't still develop a legal framework concerning WUAs.
- The absence of people participation during the planning and construction of the irrigation was among the principal reasons for the observed very limited beneficiaries' participation and sense of ownership.
- The design problem observed in the irrigation canal, especially in the tertiary and quaternary canals, would create a serious water shortage problem and subsequently there would be serious water conflicts unless immediate and effective corrective measure is taken by the responsible government institutions.

- Most tertiary and field canals constructed as raised canals have become dysfunctional to convey water as intended in the design. As per the design document, siphon was used to divert water from the canals to the furrows. But none of the irrigators was practicing the same. Farmers were creating their own conveyance system bypassing developed canal and water control structures. Consequently, there was tremendous water loss when water was made to flow on temporary conveyance system.

- Many beneficiary farmers own excess irrigable land than they can manage. Some farmers have even rain fed land outside the command area. Consequently, they do not have the capacity and the commitment to manage both irrigated and rain fed farms.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The major objectives of this study were to investigate beneficiary farmers' participation in the MOM of public large scale irrigation scheme; and to examine/ explore the socio-economic and institutional factors which influence the willingness of these beneficiary farmers in the MOM of the irrigation scheme. In view of the results the following conclusion can be drawn:

- Despite of the huge amount of capital invested in this irrigation scheme, its performance was much below the minimum expected level. Thus, it was giving the intended benefit expected of it neither at the local level nor at the national level.

- The extent of beneficiary farmers' participation in the MOM of public large scale irrigation scheme (both in quality and quantity) was below satisfactory. This very unsatisfactory farmers' participation was reflected in the untimeliness and inadequate distribution of irrigation water, the increasing number of conflicts over the use of water, the significant number of land left uncultivated which should have been cultivated, the unsatisfactory cropping pattern and cropping intensity, etc. It was only in the irrigation canal maintenance activities, which were organised by

the irrigation project office, the beneficiaries participation were relatively good.

- The independent variables of the beneficiary farmers' like educational level, wealth status, off-farm economic activities, and irrigation experience influence the farmers willingness to participate in the MOM positively, while variables like age influence the farmers' willingness negatively.

- Institutional support like training, input support, market support, etc. has a strong positive impact on the farmers economic achievement and their subsequent perception and participation in irrigation systems. As the study result indicated, however, these support services were not given to the beneficiary farmers at the required time, amount and quality.

- 18% of the beneficiary farmers own more than 1.5 ha of irrigated land and about 7.5% of the beneficiary farmers had rain fed agricultural land. Most of the times, these farmers left their land uncultivated and thus have a very limited commitment to participate and manage both their land and the irrigation system.

- More than 1056 ha of irrigated land (15.1% of the command area) were not giving service (left uncultivated). Among the identified reasons for this problem, design problem of the irrigation structure, absence of

productive (capable workforce) in the household and/or holding of land beyond the capacity to manage, and reservation of land for research and investment were the major ones.

- WUAs are the essential and the pre-requisite criteria for the successful implementation of Participatory Irrigation Management (PIM). However, there was no a legal framework and directives which favour/support the formation and functioning of WUAs.

6.2 RECOMMENDATIONS

The views contended herein below demand the concerted efforts of all concerned and interested stakeholders so as to narrow missing gaps and thereby improve the performance of both the existing and the forthcoming similar public large scale irrigation schemes.

- Real commitment and effort has to be made by all the responsible and interested stakeholders to involve beneficiary farmers in all pre-construction, construction and operation phases of irrigation schemes development.

- As WUAs are the most important preconditions for successful implementation of the concept PIM, the government has to issue a legal framework that recognize WUA as a legal entity; and promote the formation and functioning of this association.

- Unlike rain fed agriculture, irrigation agriculture is both labour and capital intensive. Thus, land reform has to be made to eliminate the problem of leaving land uncultivated which results from holding of land beyond managing capability. This has a dual advantage, viz, it provides opportunity for landless farmers to have land and it augment the expected output of the investment.

- As the level/extent at which beneficiary farmers benefited from the irrigation scheme determine their perception and participation, serious attention has to be given by all concerned institutions for the timely, adequate and quality support services which include training, regular extension service, agricultural inputs, market support, etc.

- Though the intervention in setting up of WUA, besides formulation of law, is usually made by government, WUAs established only through top-down approach or forced approach without beneficiaries' participation has not been sustainable. Thus, to establish a win-win situation, well planned advocacy on the importance of beneficiaries' participation has to be done by the responsible government institutions prior to any attempt to establish WUAs.

- Since the sustainability, efficiency, and effectiveness of irrigation structures is easily affected by the problem of sediment resulted from upstream soil erosion problem, mechanisms that motivate and benefit

the up stream's community to implement appropriate soil and water conservation measures has to be developed.

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Annexure 1

STRUCTURED INTERVIEW FOR BENEFICIARY FARMERS

Code: _____ Date: _____

1. General Information Of Beneficiary Respondent

(Please tick " √ " in the box "☐")

- Name of respondent: ----------
- Name of Peasant Association (PA): ----------
- Name of 'Gote'/village: ----------
- Gender: ☐Male ☐Female
- Age: ☐ <30 ☐30-50 ☐ >50
- Family Size: ☐ <5 ☐ 5-7 ☐ >7
- Household Irrigation land holding size: ☐ <0.5 ha ☐ 0.5-1ha ☐ >1ha
- Household rain fed land holding size
- Education Level: ☐ Illiterate ☐Formal Education ☐Non-formal educ.
- Type of House: ☐ Grass Roofed ☐CIS Roofed
- No. of Children aged >7 yrs: _____ ;
- No. of Children enrolled in school _____
- No. of live stocks
    - Ox _____ cow_____ sheep _____ goats_____
    - Donkey _____ horse_____ mule _____ others _____
- Family members engaged in off-farm economic activities: _____
    - Types of off-farm economic activities
        - _____
        - _____
        - _____

2. Data Collection Sheet on the Extent of Beneficiaries' Participation in MOM of Public LSIS

1	**Have you been participating in the planning of water distribution schedule**
	1)Yes 2) No
2	**If No, why?**
	1) I am not invited
	2) I wouldn't make a difference
	3) The place and time is not conducive
3	**If No, who is making the decision?**
	1) Irrigation project office
	2) Agricultural office
	3) PA leaders
	4) Water committee
	5) Other, specify
4	**Have you been participating in the planning of water fee payment and collection**
	1)Yes 2) No
5	**If No, why?**
	1) I am not invited
	2) I wouldn't make a difference
	3) The place and time is not conducive
6	**If No, who is making the decision?**
	1) Irrigation project office
	2) Agricultural office
	3) PA leaders
	4) Water committee
	5) Other, specify
7	**Have you been participating in the planning of irrigation canal maintenance?**
	1) Yes 2) No
8	**If No, why**
	1) I am not invited
	2) I wouldn't make a difference
	3) The place and time is not conducive
9	**If No, who is making the decision?**
	1) Irrigation project office
	2) Agricultural office
	3) PA leaders
	4) Water committee
	5) Other, specify
10	**How often over distribution and use of water conflicts happened?**
	1) Most of the times
	2) Sometimes

	3) Rarely
11	**Who is resolving conflicts among water users?**
	1) Irrigation project office
	2) Woreda ARD office
	3) Woreda Adm. Office
	4) The village people
	5) Other, specify
12	**Have you been participating in the maintenance of irrigation canals?**
	1) Yes 2) No
13	**If Yes, how?**
	1) Money
	2) labour
14	**If No, why**

3. Data Collection Sheet on the Quality of Irrigation System

1	**Is the quantity of water distributed matches with the required amount**
	1) Yes 2) No
2	**If No, what do you think the reason?**
	1) Improper planning
	2) Influential social groups take large share
	3) Leakage and loss in the structure
	4) Siltation problem in the canal
	5) Others, specify
3	**Is it fair the schedule and distribution of water?**
	1) Yes 2) No
4	**If No, what is the problem?**
	1) It favour some influential social groups
	2) If favour the mouth end users more
	3) Other, specify
5	**Is the water distributed reaches and leave the farm land on time?**
	1) Yes 2) No
6	**If No, what are the reasons?**
	1) Improper planning
	2) Leakage and loss in the structure
	3) Water theft
	4) Water scarcity
	5) Other, specify
7	**How often conflicts among water users happened?**

	1) Most of the times
	2) Some times
	3) Rarely

4. Data Collection Sheet on Agricultural Production

i. Before Irrigation (Rain Fed Agriculture)

s.n	**Belg Cropping Season**			**Mehir Cropping Season**		
	Crop Type	Area (ha)	Ave. yield	Crop Type	Area (ha)	Ave. yield

ii. During Irrigation Farming

SN	**Cropping Season I**			**Cropping Season II**			**Cropping Season III**		
	Crop Type	Area (ha)	Ave. yield	Crop Type	Area (ha)	Ave. yield	Crop Type	Area (ha)	Ave. yield

5. Data Collection Sheet on Willingness of Beneficiary Farmers towards Participation in MOM of Irrigation Scheme

1	**Are you willing to participate in the planning and monitoring of water distribution**
	1) Yes 2) No
2	If No, Why?
3	**Are you willing to pay water fee?**
	1) Yes 2) No
4	**Are you willing to contribute family labour for maintenance of canal?**
	1) Yes 2) No
5	If No, Why?
6	**Are you willing to contribute cash for maintenance of canal?**
	1) Yes 2) No
7	**If No, Why?**
8	**Are you willing to participate in resolving conflicts among water users?**
	1) Yes 1) No
9	**If No, why?**
	•
	•

6. Data Collection Sheet on Support Services

1	**Are timely supplies of agricultural inputs satisfactory?**
	1) Very satisfactory
	2) Moderately satisfactory
	3) Poorly satisfactory
2	**Is agricultural inputs adequately supplied?**
	1) Yes, in a much satisfactory manner
	2) Yes, but less satisfactory
	3) No
3	**Do you face market problem for products?**
	1) Yes 2) No
4	**If Yes, how do you describe the extent of the problem?**

	1) Extremely serious
	2) Serious
	3) Less serious
5	**If Yes, have you been given market support service by any institution?**
	1) Yes 2) No
6	**If Yes, were they effective?**
	1) Yes 2) No
7	**Have you been told about the importance and method of forming WUA?**
	1) Yes 2) No
8	**Have you been given training on the management and utilization of both the irrigation water and the irrigation structure?**
	1) Yes 2) No
9	**Have you been told that water is an economic good for which payment has to be made?**
	1) Yes 2) No

Annexure 2

STRUCTURED INTERVIEW FOR FUNCTIONARIES OF GOV'T OFFICES

Name of Institution: _____ Date: _____

I. General Information Data

3. The irrigation scheme total command area: _____ha

4. Out of the total potential command area, developed area to date: _____ ha.

5. The expected numbers of total beneficiary households: _____

6. Percentage of female headed beneficiary households: _____ % (rough estimate)

7. The minimum, maximum and average irrigated land holding size per household and their rough percentage estimate
Minimum land size: _____ ha; percentage _____ %
Maximum land size: _____ ha; percentage _____ %
Average land size: _____ ha; percentage _____ %

8. Percentage of beneficiary households with CIS roofed house: _____ % (rough estimation)
9. Are there farmers who rent-out or sharecrop their land?
10. If Yes to Q.5, what do you think their reasons to do so?
    1) _____
    2) _____
    3) _____
    4) _____
    5) _____
11. Are there farmers who do not cultivate their irrigated farm land wholly or partly in either of the cropping seasons?
12. If Yes to Q. 7, what do you think their reasons to do so?
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____
13. Is there any users' group/organisations established that facilitate participation of beneficiaries in MOM of the irrigation scheme?
    1) Yes 2) No

14. If Yes to Q. 9, describe how it operates and its effectiveness?

II. Data Collection Sheet on the Extent of Beneficiaries' Participation in MOM of Public LSIS

1	**Do farmers participate in the planning of water allocation and distribution schedule?**
	1)Yes 2) No
2	**If No, why?**
	4)
	5)
	6)
	7)
3	**If No, who is making the decision?**
	6)
	7)
	8)
	9)
	10)
4	**Do farmers participate in the planning of irrigation canal maintenance?**
	1) Yes 2) No
5	**If No, why?**
	4)
	5)
	6)
6	**If No, who is making the decision?**
7	**How often over distribution and use of water conflicts happened?**
	4) Most of the times
	5) Sometimes
	6) Rarely
8	**Who is resolving conflicts among water users?**
8	**Do farmers participate in the maintenance of irrigation structures?**
	1) Yes
	2) No

III. Data Collection Sheet on Agricultural Production

1) Before Irrigation (Rain Fed Agriculture)

s.n	**"Belg" Cropping Season**		**"Mehir" Cropping Season**	
	Crop Type	Ave. yield	Crop Type	Ave. yield

2) During Irrigation Farming

SN	**Cropping Season I**		**Cropping Season II**			**Cropping Season III**	
	Crop Type	Ave. yield	Crop Type	Area (ha)	Ave. yield	Crop Type	Ave. yield