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Evaluate the Farmers' Participation for Irrigation Development in Nepal

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ABSTRACT

Purpose: The overall objective of the research was to evaluate the farmers' participation through documentation of project development and implementation procedure of Lipe Khola Baseri Irrigation Sub Project, Okhaldhunga District, Nepal. The study focuses on project management methodology and farmers' participation.

Design/Methodology/Approach: To meet the above objectives primary and secondary data were collected. Household survey, key informants interviews, and focused group discussion were carried out to collect the primary data in the study and secondary data were collected through project-related documents, reports, websites, publications, and journal articles. Both quantitative and qualitative approaches were applied for the research work.

Findings/Result: The project management methodology of the Lipe Khola Baseri Irrigation Project had followed Community Managed Irrigated Agricultural Sector Project's (CMIASP) project management methodology. The project was need-based. Proper farmer participation was ensured in each procedure of the project management. Farmers had strongly participated in the formation of the Water User Association (WUA), detail survey, construction, and monitoring work. The implementation procedure involved WUA in the construction, monitoring, and supervision of the irrigation system. The project had gone through a time overrun. Quality construction was ensured during the construction of the project.

Originality/Value: This study helps policymakers and local level government to assure construction with compliance of standards. It makes it easier for policymakers to incorporate the development needs without compromising quality through regulatory provision.

Paper Type: Archival Research

Keywords: Construction, Involvement, Farmers, Phases of Project, WUA

1. INTRODUCTION

Nepal is facing budget deficiency and most of its economy depends upon foreign Aids (Mishra and Aithal, 2021)[1,2]. It is most for us to uplift the living standard of the people, it is evident that the improvement in agriculture is inevitable for assuring sustainable operation. In the absence of an irrigation facility, only one or two crops are introduced in agricultural land and this creates half employment. To engage the employer fully in the agricultural sector, sufficient year-round irrigation should be ensured. To increase agricultural production, in turn, the use of various inputs such as improved seeds, fertilizers, irrigation is essential. Among these inputs, irrigation is one of the prime and important inputs. A good irrigation system facilitates year-round irrigation.

Irrigation is the artificial application of water inland for crop production. Irrigation is the prime factor for crop production. The proper irrigation system increases the crop yield, and cropping intensity. Irrigation contributes to increasing the productivity of key cereal crops, like paddy and wheat by 62% and 57 % respectively (Barai, 2014)[3]. It ensures the two or three seasonal crops in a year.

Out of the complete land area of 14,718,100 hectares, just 2,641,000 hectares (18 percent) are arable. On account of the troublesome geological territory and geography, water system administrations might be extended up to 1,766,000 hectares (67 percent) of that. Right now, water system offices serve just 1,311,000 hectares (50 percent) of farming area. Of that area, just 36% is served all year water system (NPC, 2013)[4]

Adequate surface water streams in the place where there is Nepal. The primary issue is the administration of accessible water sources. The surface water accessible in the nation is assessed to be around 225 billion cubic meters (BCM) per annum or identical to a normal progression of 7,125 m³/sec, out of which just 15 billion cubic meters (BCM) per annum are being used. Around 95.9% of the 15 billion cubic meters (BCM) has been utilized for farming, 3.8% for a home-grown reasons, and just around 0.3% for industry (WECS,201 1)[5].



This information shows that the limit of the surface water in Nepal is utilized by horticultural areas. This water is utilized as water system water and the vast majority of the water system advancement status is driven by rancher oversight water system frameworks. 70% of the absolute watered area of Nepal (1.28 million Ha) is covered by FMIS and 40 % of the food creation comes from 15000 FMIS in the slopes and 1700 frameworks in the Terai (Pradhan, 2000)[6].

The Nepal government has created the program of helping ranchers oversee water system frameworks (FMIS) to redesign their essential foundation. The complete number of FMIS is assessed at the north of 15,000, and around 3,000 have gotten a few types of help from the public authority and different benefactors. The public authority gauges that countless FMIS, with a consolidated order area of around 250,000 ha, never get help. Extra financing for the current undertaking will permit restoration and extension endeavors to arrive at a bigger number of FMIS.

2. Problem STATEMENT

In irrigation projects, the operation and maintenance part after handover to the water user's committee are very weak. The sustainability of irrigation projects is one of the major problems. So, it should be addressed while planning the irrigation project.

The main causes of the failure of the irrigation projects are the lack of proper participation of farmers and other stakeholders during project implementation. Finding the need-based project and involving the farmers from the planning of the project to the construction of the project makes the project more sustainable. Involvement of farmers in the project development procedure and involving them in decision making during the project planning to project construction improve the farmer's capability to handle the project.

This study has been conducted to assess the systematic objective achievement of the project with a case study of the Lipe Khola Baseri Irrigation Subproject of Okhaldhunga district. The study helps to find out the constraints for achieving the goal of the project and seeks to find out their probable solutions. This will be helpful in the decision level for planning and implementation of irrigation projects and reviewing and improving the irrigation policies.

3. OBJECTIVES

To evaluate the farmers' participation through documentation of project development and implementation procedure of Lipe Khola Baseri Irrigation Sub Project, Okhaldhunga District, Nepal

4. LITERATURE REVIEW

King Mani Mukunda of Palpa (400 years ago) had built the royal canal to irrigate the land of trust at Argali. Traces of *Raj kulo* of *Malla* period and *Lichhabi* period are still found in Kathmandu valley. Now, it has changed. Irrigation systems classify in two ways: based on management and based on the size of the command area:

Based on management: - Based on management practice, the irrigation system is classified into:

- i. Farmer Managed Irrigation System (FMIS)
- ii. Joint Managed Irrigation System (JMIS)
- iii. Agency Assisted Irrigation System (AAIS)(Dahal et al, 2022) [7].

4.1 Phases of Project

According to Watt, (2012) and PAM, (2014) [8 & 9], Community Managed Irrigated Agricultural Sector Project's (CMIASP) project has five distinct phases.

- i. Subproject identification, scheme verification, and SPPR preparation
- ii. Institutional development of water user association (WUAs) and detailed design
- iii. Approval of detail designed, Tendering, and construction of irrigation and associated infrastructure
- iv. Initial O & M, and Agriculture development and post-construction monitoring and support
- v. Post-investment monitoring and support

Project Organization

The way to effectively assemble another undertaking is to have indicated, characterized, and imparted liabilities and the authoritative connections. For the association group, a venture association outline is a realistic presentation of undertaking detailing connections. It very well might be formal or casual, exceptionally itemized or comprehensively outlined, in light of the need of the task.

How an association is organized can decide its viability in project advancement and execution. While settling on an undertaking association it should be the intention to give the elaborate offices and task individuals the greatest level of opportunity in their choices, to think about workforce limitations and prerequisites of the association, and to keep away from turmoil brought about by muddled sets of expectations or an amassing of co-appointment necessities.

Project Organization of CMIASP

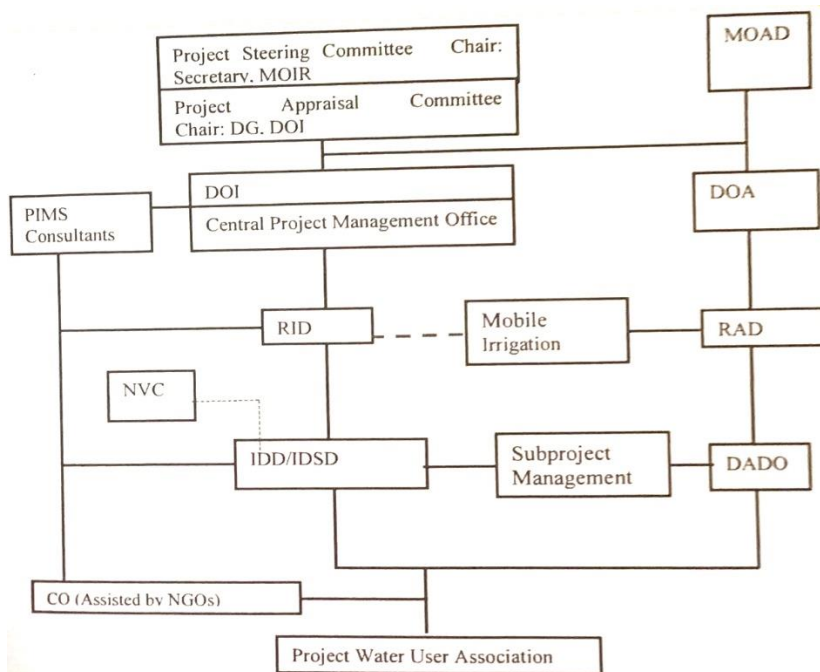


Figure 1: CMIASP organization chart

The head of the executing agency for the Community Managed Irrigated Agriculture Project (CMIASP) is the Ministry of Irrigation. The Department of Irrigation is responsible for sub-project approval. The Central Project Monitoring Office (CPMO) handles all the CMIASP subprojects from the center level. Regional Irrigation Directorate (RID) supports the IDD/ISD for project sanction and monitoring of the project. For the project monitoring, Mobile Irrigation Team (MIT) is formed in the RID. The sub-project is implemented from the IDD/ISD. The chief of the IDD/ISD is responsible for the subproject management. IDD/ISD has the main role in the successful implementation of a subproject. Project Implementation and Management Support (PIMS) exists to support project implementation and management. Community Organizer (COs) acts as a pool of Water Users Association and the IDD/ISD [9 &10].

4.2 Irrigation Project Management

The Project Management Institute's Process Group methodology defines five process groups with forty-four elements that encompass all aspects of project management. By using this framework the project manager can better ensure project success. As the limitations of the PMI method to Peace Corps project work are considerable, a new project management strategy is developed and suggested [11,12,13] as:

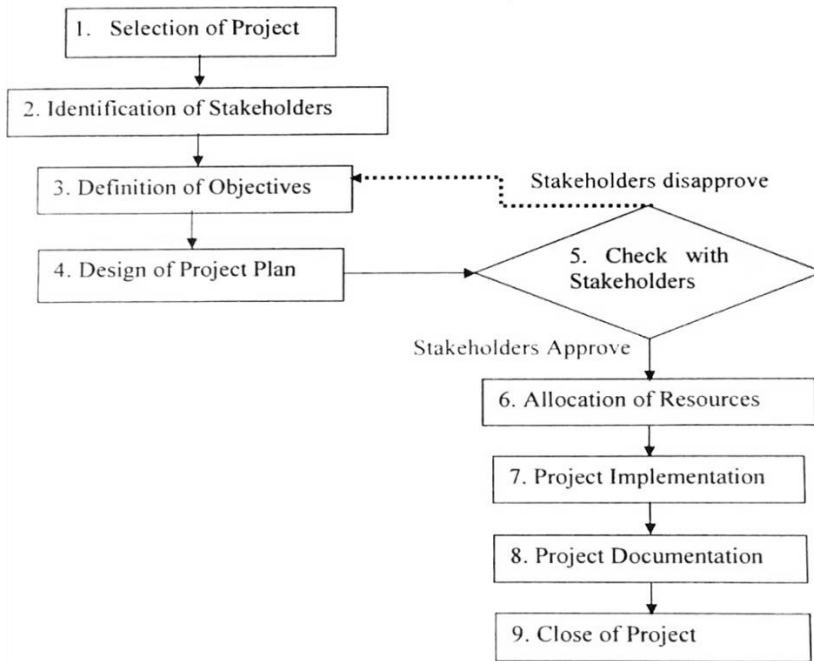


Figure 2: Project Management Methodology

Project Management Methodology of CMIASP

To meet more adequately the project management needs of the Community Managed Irrigated Agriculture Sector Project (CMIASP), a project management methodology has been developed by CMIASP. A flow chart of the project management methodology of CMIASP is shown in the figure below.

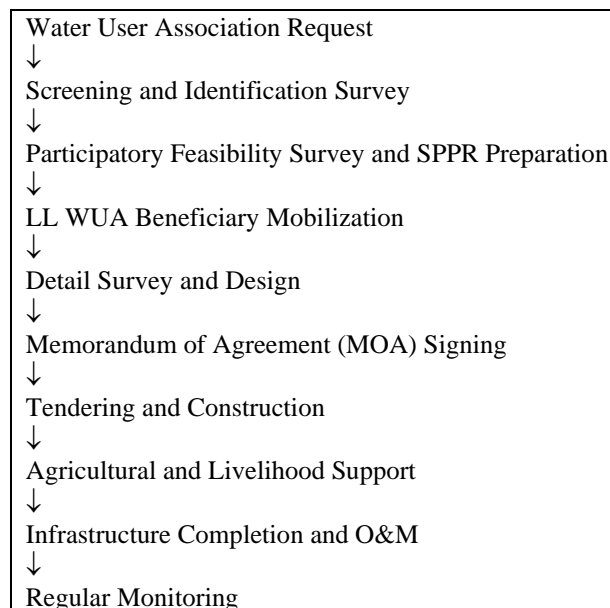


Figure 3: Project Management Methodology of CMIASP [13,14,16]

5. METHODOLOGY

In this research, the research is archival as mostly documents have been referred to frequently.

5.1 Study Area

The area of this study is the Okhaldhunga district. It is located in Sagarmatha zone in the Northeast part of Nepal. Okhaldhunga District consists of 56 Village Development Committees (VDC).

Agriculture is one of the main occupations of local people. The main crops produced in this area are rice, wheat, corn, millet, and legumes. The people use only the traditional methods of farming. More than 60% of families do not have sufficient food for a year from their production. Very few families produce vegetables, which they use only for themselves not for commercial purposes.

Lipe Khola Baseri Irrigation Project has been chosen for this study. This project is located in Kuntadevi VDC Ward number 4 of Okhaldhunga. This project provides irrigation facilities to the 30 hectare land of Kuntadevi VDC ward number 4.

The source of the project is Lipe Khola is a perennial source. The flow in the river is mainly contributed by sub-surface flow during the dry season. The duty was fixed as 2 lps per hectare and the design discharge of the project was 60 lps. This project irrigates the 30 Ha. Command area of 59 households including 75% has small or marginal landholdings (<0.5 ha). The cropping intensity of the project before project rehab was 163% and is expected to increase up to 197% (DDR Lipe Khola ISP, 2011).

Table 1: Salient features of the project

Name of the Subproject	Lipe Khola Baseri ISP
Sub-Project Classification	Rehab
Location (VDC & Ward No.)	Kuntadevi - 4, Chiuribote and Baseri
District	Okhaldhunga
District Headquarter	Okhaldhunga
Zone	Sagarmatha
Development Region	Eastern
No. of Households	59
DAG Households	10
Population	353 Landholding
Landless	
Small /Marginal	44
Middle	14
Large	1 Accessibility (Nearest Road Head)
Nearest road head	Okhaldhunga
Nearest Airport	Runijatar
Nearest Market	Okhaldhunga
Main Canal	2.86Km.
Gross Command Area	35 ha.
Net Command Area	30 ha.
Existing Area	30 ha.
Extension Area (if any)	
Name of Source	Lipe Khola
Type of Source	Perennial
Catchment Area	3.1 sq.km.
Canal Type	Earthen
Canal Discharge	60 lps
Existing Diversion Structure	Boulder & Bush Diversion
Main and Branch Canal Works (m)	Reshaping
Main canal	2.86 km
Headworks/ Diversion Structure	Single Orifice Side Intake -I No
Main Canal	
Canal Lining Both sides (m)	380
Canal Living one side (m)	23
HDP Pipe Canal (m)	140
Covered Canal (m)	30
Super passages (Nos.)	2
Outlet (Nos.)	13
Side Escape (Nos.)	1
- l'al7fon retaining wall	80 m
Masonry retaining wall (m)	30 m
Dry Retaining Wall (m)	30 m
Present cropping intensity	163%
Present cropping intensity	197%
Total estimated cost including contingency & VAT	NRs.7,595,057.45
Cost Per Hectare	NRs.253,168.58
WUA Contribution @3%	NRs.275177.30
Economic Internal Rate of Return (EIRR)	24.51%

Source: DDR, Lipe Khola ISP, 2011

Study Population

For the study population, the total population of the research was total households that city benefitted from the Lipe Khola Baseri Irrigation Sub Project. The total benefitted households of the system were 59. Therefore, the total study population of this research is

Sample Selection

The sample was randomly selected from the total population of 59. Sample size was calculated by using Cochran formula,

$$n = (Z^2 * p * q * N) / [e^2 * (N - 1) + Z^2 * p * q]$$

Where, n —Sample size, $Z=1.96$ for 95% confidence, p =percentage of picking choice (0.50), $e=0.05$, N —whole sample size.

5.2 Collection of Data

Primary and secondary data were collected for this study.

5.2.1 Primary Data Collection

Key informant interview

Key informant interview to the Division Chief of Irrigation Development Division Okhaldhunga was conducted for the project management methodology and process of farmers participating in the different phases of a project. Key informant interview was taken to the chairperson and treasurer of WUA to know the WUA status, conflict management, procedure of operation and maintenance of the project, and major problem related to irrigation water management. Key informant interview was done to the District Agriculture Development Office (DADO), Office.

Focus Group Discussion

Focus group discussion was conducted in three different groups. Each group included six participants. The focus group discussion was oriented toward the farmer's participation during the different phases of the project development, operation, and maintenance of the system and change in agricultural cropping pattern, cropping intensity, and yield of the project area.

Questionnaire Survey

Out of 59 households, 50 numbers of the household were randomly selected in this questionnaire survey. The questionnaire survey included the perception and involvement of the farmer's participation in different phases of project development and irrigation water management. After the questionnaire survey, all the participants were divided into three groups head user farmers, middle user farmers, and tail user farmers.

5.2.2 Secondary Data Collection

Project-related secondary data were collected from IDD, Okhaldhunga. The project report, data about the implementation procedure of the project were collected from the IDD, Okhaldhunga. Data related to WUA formation, audit reports, and WUA meetings were collected from the WUA offices. Other data were collected from:

- ✓ Library Nepal Engineering College and library of Department of Irrigation
- ✓ Sub Project Proposal Report (SPPR) of the project, Detail Designed Report (DDR) of the project from IDD, Okhaldhunga
- ✓ DOI/CMIASP paper presentation, publications.
- ✓ Internet/Websites.
- ✓ Books and journals
- ✓ 5.3 Analysis of Data

The information obtained from the interviews was compiled and analyzed to prepare this report. All the randomly selected respondents were divided into three categories as head users, middle users, and tail users. WUA divided the canal into four segments for effective operation and maintenance. For this study those farmers whose land exist in segment one that is divided by the WUA for operation and maintenance is considered as the head user, farmers having land in segment two and segment three is considered as a middle user, and farmers having land in segment four is considered as a tail user.

Based on their qualitative analysis of all relevant primary and secondary data recommendations have been made. The issues related to management, problem in participation were analyzed by the information obtained from the interviews of IDD, Okhaldhunga Chief, and WUA members of the project.

The collected data was compiled, analyzed, interpreted, and presented based on the quality and nature of the data. The qualitative data was presented to develop the logical sequence whereas the quantitative data were presented in tables and figures and percentages.

6. RESULTS AND DISCUSSION

6.1 General Analysis of Data

6.1.1 Household Composition

From the total sampled data of 50 households, it was found that 16 numbers of respondents were head users, 20 numbers of respondents were middle users and 14 numbers lay in tail users. There were 5.5 members per household on average. Male-headed families dominated the users of the project area. Among the data collected 16% (8 Nos.) are female-headed and the remaining 84% (42 Nos.) are male-headed.

6.1.2 Caste and Ethnicity

Chhetris were dominating caste in this project area and was followed by Janajati (Rai) and Dalit. The distribution of household respondents can be seen in table 2.

Table 2: Ethnicity Distribution of the household

Ethnicity of respondents' household	Freq. N=50	Percent
Chhetri (Khadka, Baniya)	39	78
Janajati (Rai)	8	16
Dalit (Damai)	3	6
ce Total	50	100

6.1.3 Major occupation

The major occupation of the project area is shown in table 3. Agriculture was found as the major occupation of the project area. From the field survey, it was shown that 80% (40 Nos.) household's major occupation was agriculture and 14% (7 Nos.) household's members were abroad and remittance is the main source of income and only 6% (3 Nos.) were in service.

Table 3: Major occupation of the project area

Major Occupation of the project area household	Freq. N=50	Percent
Agriculture	40	80
Trade/Business	0	0
Service	3	6
Remittance	7	14
Total	50	100

6.2 Project Management Methodology and Farmers participation

From the key informant interview, it was found that the project management methodology of the Lipe Khola Baseri ISP was:

- ✓ Farmers Request form
- ✓ Screening and Identification of Survey
- ✓ SPPR (Subproject Proposal Preparation Report) Preparation and WUA mobilization
- ✓ Detailed survey. Design and signing of MOA
- ✓ Tendering and construction
- ✓ Infrastructure Completion, test run, and project handover

6.2.1 Farmers Request Form

From the record of IDD. Okhaldhunga, it was observed that with the signature of most of the farmers of the Lipe Khola Baseri ISP. users registered the request form in IDD, Okhaldhunga on March 15, 2009, along with the recommendation of Kuntadevi Village Development Committee and the District Development Committee of Okhaldhunga district. At the submission of the farmer's request form, the user's committee had deposited the upfront cash of the amount is. 40,000. The contribution criteria of the users per household are shown in table 4.

Table 4: Criteria for cash contribution during project demand

Category	No. of HH	Description	I contribution (NRs.)
A	14	lands required >10 pathi seeds	1000.00
B	12	lands required 6-10 pathi seeds	800.00
C	18	lands required 4-6 pathi seeds	600.00
D	14	lands required < 4 pathi seeds	400.00

Source: WUA minute book

Farmers were asked the question to know whether the project was need-based or not. Table 4-4 shows that a total of 100% of respondents responded that they felt the necessity of the project before the project started. The majority of the respondents 88% (44 Nos.) said that they participated in the project demand meeting and 12% (6 Nos.) said that they did not attend that meeting because they were out of the village.

Table 5: Necessity and farmers' participation of project in demand Freq. N=50 Percent

Did you feel the necessity of this project before the project started?				Frequency No.	Percent	
Respondents	Yes			50	100.00	
	No			0	0.00	
Total				50	100.00	
Did you participate in the Project demand meeting?		Head Users N = 16	Middle Users N = 20	Tail Users N = 14	Total Respondents	Percent
Respondents	12		18	14	44	88.00
	4		2	0	6	12.00
	16		20	14	50	100.00

This shows that the project was need-based and the farmers had great enthusiasm about the project initiation. Farmers were aware of the project.

6.2.3 Subproject Screening and Identification Survey

From the key informant interview of staff, it was found that the written demands from the farmers were collected from the whole district and the initial screening was done followed by prioritization and ranking. Six projects were selected for the identification survey. The field verification was done for the top prioritized sub-projects and a field verification report was prepared. NGO was involved during the selection of the project.

From the data obtained from IDD, Okhaldhunga district it was found that the subproject had been selected based on the selection criteria that was approved by the Institutional Strengthening and Project Management Consultants (ISPMC). An identification survey of Lipe Khola ISP was undertaken by the IDD, Okhaldhunga on July 25, 2009. The member of DADO was also involved in the identification survey. The identification survey was done after four months of the farmer's request. This survey verified the project condition and selected the project as per the selection criteria of CMIASP. The selection of the project is shown in annex:1

The subproject complied with all the agreed selection criteria except for the cost per ha. The cost per ha. Of the project was \$3409 which was greater than 51500 per ha. Small command area, environmental protection work (Gabion retaining wall. Random Rubble Masonry (RRM) wall) and canal lining were the causes of exceeding the cost per hectare of the project.

6.2.4 Sub Project Proposal Report Preparation, Approval, and WUA Mobilization

A joint walk-through survey was done on 2 August 2010. WUA members, farmers, and representatives of IDD, Okhaldhunga was in the joint survey team. An initial meeting was organized on 2nd August 2010 with Water User's Association (WUA) members and the farmers who own the land parcels through which the existing canal is passing. From the data obtained from IDD, Okhaldhunga district, it is found that most of the households of the farmers were involved in those initial meetings. The record shows that 53 nos. of farmers' household's representatives was attended those meetings and they were ready to donate the land for irrigation canal voluntarily.

From the key informant interview of staff of IDD, Okhaldhunga district, it was found that the SPPR report was prepared based on the field verification report and joint walkthrough survey which was done in August 2010.

To know the participation of farmers during, the walk-through survey, it was asked whether they participated in the walk-through survey or not. 32% (16 Nos.) of respondents responded that they were involved in the walk-through survey and 68 % (34 Nos.) said that they did not involve in the walk-through survey. From the focus group discussion between the farmers, it was found out at the time of the joint walk-through survey, 15-20 members of farmers (most of the committee members and few farmers) were involved.

From the SPPR report of Lipe Khola Baseri ISP, it was found that the SPPR of the sub-project was prepared

as per the guidelines of the ADB. This sub-project preparation report included the technical aspect as well as the implementation plans, Institutional development plan, Infrastructure development plan, water management plan, and resettlement plan. The concepts were similar to that of Sharma and Shukla[14,15]

The SPPR was submitted in RID in 2010 October and the RPSU forwarded the project after verification on January 12, 2011. The Project Approval Committee (PAC) approved the SPPR on January 31, 2011.

There is a large (one-year) gap between the identification survey and the feasibility survey. According to a key informant interview with the IDD, Okhaldhunga the feasibility survey was done according to the schedule of the CMIASP and the feasibility survey was done on the schedule.

The time is taken for the survey, Sub Project Preparation Report preparation, and approval of the project was six months. The report was prepared within three months of the survey and the report was approved after three months of the submission for approval. The report approval time was quite lengthy due to the report approval process.

In this sage, a WUA committee of 11 members including 4 females, one Dalit was formed by the selection from the mass meetings.

Farmers' participation in WUA mobilization

To find the level of farmers' participation in WUA mobilization, a household survey and focus group discussion was conducted. Status of WUA, the process of WUA formation, involvement of farmers information of WUA, arrangements of meetings, conduction of general assembly, involvements of farmers from all areas during WUA formation. Participation in the mass meeting during detail survey, participation in discussion in types of structure proposed participation in WUA formation.

Table 6 shows the response of household survey in the status of WUA, the process of WUA formation, and the involvement of farmers in WUA formation. In the status of WUA, 56% (28 Nos.) respondents said that WUA has the legal identification, 26 % (13 Nos.) said the WUA is organized but not registered and 18 % (9 Nos.) said no idea due to the confusion. They were not aware of the status of WUA. In the process of WUA formation, 64% (32 Nos.) said that the WUA was formed by the selection by mass meeting, 16 % (8 Nos.) said no idea, and 20 % said selection by ad-hoc. In the involvement of users in the formation of WUA, 10 % (5 Nos.) said that more than 75 % of representatives of the farmer were involved in the WUA formation process, 64 % (32 Nos.) said more than 50% of farmers involved, 12% (6 Nos.) said >25% involved and 14% (7 Nos.) said that they had no idea. From focused group discussion, it was found that more than 60% were involved in the formation of WUA.

This shows that the majority of the farmers participated in the WUA formation process and were aware of the WUA activity. The result shows that the tail user and middle user farmers were more aware of the WUA activity.

Table 6: WUA status and formation process

Status of WUA		Head Users N = 16	Middle Users N= 20	Tail Users N = 14	Total Respondents	Present
Respondents	Legal Identification	8	12	8	28	56.00
	Organized but not registered	2	6	5	13	26.00
	No idea	6	2	1	9	18.00
	In process of formation					
	Total	16	20	14	50	100.0
How the WUA was formed?		Head	Middle	Tail	Total	
Respondent	Selection by a mass meeting	8	13	11	32	64.00
	No idea	4	4	0	8	16.00
	Selection by ad-hoc	4	3	3	10	20.00
	Total	16	20	14	50	100.0
How many users were involved in the formation of WUA		Head	Middle	Tail	Total	
Respondents	100%	0	0	0	0	0.00
	>75%	1	2	2	5	10.00
	>50%	11	12	9	32	64.00
	>25%	1	3	2	6	12.00
	No idea	3	3	1	7	14.00
	Total	16	20	14	50	100.0

From the focused group discussion and the key informant interview, it was found that the WUA had registered at IDD, Okhaldhunga and the WUA renewed annually as per the rule. WUA was formed the selection by mass meeting and more than 75 % of households representative participated at that mass meeting.

In the conduction of general assembly, 70% (35 Nos.) said that yes and 16% (8 Nos.) said No and 14 % (7 Nos.) said no idea. For the participation of the general assembly 70% (35 Nos.), said yes and 30 % (15 Nos.) said no. For the involvement of farmers in WUA from all areas of irrigation 66 % (33 Nos.) said Yes, 20 % (10 Nos.) said No and 14 % (7 Nos.) said no idea. The result is shown in Table 7. Those participants who said that they participated irregularly or never in general assembly meetings said that they have no idea about the conduction of general assembly meetings [11,13].

Table 7: General assembly and farmer's participation

Conduction of general assembly meetings		Head Users N = 16	Middle Users N= 20	Tail Users N = 14	Total Respondents	Present
Respondents	Yes	9	14	12	35	70.00
	No	4	3	1	8	16.00
	No Idea	3	3	1	7	14.00
	Total	16	20	14	50	100.00
Do you regularly participate in general assembly meetings?		N=16	N=20	N= 14	Total	Percent
Respondent	Yes	9	14	12	35	70.00
	No	7	6	2	15	30.00
	Total	16	20	14	50	100.00
Is WUA formed by the involvement of farmers from all areas of the irrigation system?		N=16	N=20	N= 14	Total	Percent
Respondents	Yes	9	14	10	33	66.00
	No	4	3	3	10	20.00
	No Idea	3	3	1	7	14.0
	Total	16	20	14	50	100.00

From the key informants' interviews and focused group discussion, it was known that the general assembly is conducted 2 times (on the day of *Asar* and *Kartik*) in a year. More than 75% of farmers participated in *Kartik*'s general assembly and more than 60% of farmers participated in the general assembly held in *Ashar*.

6.2.5 Detail Survey and Design

From the key informant interview and the data obtained from the IDD, Okhaldhunga, it was found that, after the Project approval (SPPR report approval) by the PAC (Project Appraisal Committee), the IDD Okhaldhunga started the detailed survey and design of the project. The Detail survey was done in February 2011.

From the key in-foment interview of WUA members and focused group discussion, it was found that the farmers have participated in the detailed survey of the project. Joint walkthrough survey of the proposed system and consulted intensively with the WUA regarding their proposed infrastructure improvements and agricultural enhancement aims. The survey team conducted the technical survey of the system and collected baseline socio-economic and agricultural data. WUA members and farmers helped the survey team to survey the work by clearing the bushes, acting as the supporting staff during the survey. They also shared information about the trend of Lipe Khola and helped to locate the intake location during the survey.

After the detailed survey work, the farmers' mass meeting was conducted and more than 70% of farmers' representatives have attended those meetings. In the meetings, the survey team described the situation of the canal and the types of suitable structures proposed. The farmers also discussed the existing problem of the canal, suggested, and discussed the probable solution to the problem

Table 8 shows the respondents' view in terms of participation in detailed survey work and mass meetings during the detailed survey. In the participation during detail survey, 30 % (15 Nos.) said they were involved and the rest 70% (35 Nos.) they did not involve but in the mass meeting during after detail survey, 78% (39 Nos.) participated and 22% (11 Nos.) did not involve in the mass meeting. From the survey, it was found that middle user and tail user farmers actively participate in WUA activity as compared to head user farmers. From focused group discussion, it was found that before the project, head user farmers were less interested in the project because there was excess water available at head reach.

Table 8: Farmers' participation in detailed design and survey work

Did you participate in detailed survey work?		Head users N = 16	Middle Users N = 20	Tail users N = 14	Total Respondents	Percent
Respondent	Yes	4	7	4	15	30.00
	No	12	13	10	35	70.00
	Total	16	20	14	50	100.00
Is WUA formed by the involvement of farmers from all areas of the irrigation system?		N = 16	N=20	N= 14	Total Respondents	Percent
Respondents	Yes	11	16	12	29	78.00
	No	5	4	2	11	22.00
	Total	16	20	14	50	100.00

From the focused group discussion with WUA members, it was found that the IDD, Okhaldhunga discussed the detailed design report with the WUA members before submitting it into RID. From the key informant interview with WUA member and Chief of IDD, Okhaldhunga, it was found that IDD, Okhaldhunga discussed the detailed design report with WUA and the suggestions (about the geological condition of the canal alignment and nature of the Lipe Khola) of WUA were also addressed in the detail design report. WUA endorsed the detailed design report after a brief discussion with IDD, Okhaldhunga. The report was forwarded in RID, Biratnagar after endorsement with WUA.

From the data obtained from IDD, Okhaldhunga, the detailed design report was prepared in the given format by ISPM consultants and submitted to RID, Biratnagar with the recommendation of IDD, DDC, DADO, and DOI on 30 May 2011. The MIT team of RID checked and verified the report and approved the detailed design report by the director of RID on June 10, 2011.

6.2.6 Tendering and Construction of the work

In the approved detailed design report of Lipe Khola ISP, the implementation procedure was proposed in three modalities. The work packaging of the project was:

Table 9: Work Packaging of Lipe Khola ISP

Package	Type	Amount	% of construction cost
1st	WUA Contribution	255177.3	4.97
2nd	WUA Payable	1110858.6	20.03
3rd	Tender Part	4160751.72	75

Source: IDD, Okhaldhunga

- ✓ Some part of the work that can be constructed by the capacity of the WUA was constructed through the WUA as WUA payable part
- ✓ Earthwork part was constructed by WUA as a WUA contribution part
- ✓ Major work was constructed by the selection of contractor by tendering method but in the tendering method WUA did not involve

6.2.7 Contract work with WUA

The WUA contribution and WUA payable works were started after an agreement between IDD, Okhaldhunga, and WUA. The agreement date was 16/06/2011. The agreement amount for the contribution work was NRs. 275,177.30 and WUA payable work was NRs. 1,110,858.60, which were 4.97 % and 20.03% of the total estimated construction cost of the project. The initial date of completion of the project was 19/12/2014. Data shows that the project was gone on-time extension. The project did not complete on time and the time was extended by 6 months up to 28/12/2013. The causes of time extensions were heavy rain, blockage of the road due to landslides.

Table 10: WUA contribution work details

Amount	Contract Date	Work completion date	Work completed date	Time extension if	Causes of time extension
275177.30	16/06/2011	19/06/2013	19/12/2014	8/12 2013 (6 months extended)	Heavy rain, blockage of road, strike.

Source: IDD, Okhaldhunga

Table 11: WUA Payable work details

Amount	Contract Date	Work completion date	Work completed date	Time extension if	Causes of time extension
1110858.0	16/06/2011	19/06/2013	19/12/2014	28/12/2013 (6 months extended)	Heavy rain, blockage of the road, strike

Source: IDD, Okhaldhunga

WUA had formed a construction subcommittee to complete the work agreement with IDD, Okhaldhunga. Six person subcommittee with one woman and one Dalit was formed as the chairman of Tek Bashadur Khadka. The responsibility of the construction team is to manage the internal resource to complete the work as per agreement within agreement date similar to ADB concepts [16].

Farmer Participation in Construction Works

WUA strongly participated in the construction and supervision of the project. According to key informant interviews, focused group discussion, and data obtained from WUA and IDD, Okhaldhunga, WUA had constructed the track of the canal voluntarily. The quality of construction work was monitored and controlled by IDD, Okhaldhunga.

From the focused group discussion with WUA members and key informant interviews with WUA members, it was found that the WUA was fully involved in the construction of the project. WUA was involved in the construction of the project voluntarily and also constructed some structures as payable parts.

For the contribution part of the agreement, WUA had divided the types of farmers according to the land size they owned. They divided the farmers into four groups. (Source: WUA minute book)

Group 'Ka'	land size that uses the seed of rice greater than 10 Pathi
Group `Kha'	land size that uses the seed of rice between 6 to 10 pathi
Group `Ga'	land size that uses the seed of rice between 4 to 6 pathi
Group `Gha'	land size that uses the seed of rice less than 4 pathi

From the committee meeting, WUA formed a rule for the farmer's contribution as per the group category. (Data source: WUA minute book)

Group 'Ka'	22 days
Group `Kha'	18 days
Group `Ga'	15 days
Group `Gha'	12 days

The monitoring and supervision subcommittee kept the attendances of the labor contribution of the farmers. From the key informant interview and data obtained from IDD, Okhaldhunga, it was found that farmers had contributed 38.77% more contribution work than the agreement. This proves the farmers' willingness in the project development.

For the involvement of farmers in the construction of the canal, respondents were asked whether they participated in the construction works or not and 100% of respondents said that they participated in the construction of the project.

6.2.8. Contract work with Contractor

- ✓ Estimated amount of tender work: 4160751.72
- ✓ Tender notice published date: 21 June 2011
- ✓ Number of bids registered:3
- ✓ Number of substantively responsive bids:
- ✓ Evaluation procedure: Technically capable contractor selected for financial evaluation
- ✓ Contractor selection procedure: contractor quoting the least bidding amount was selected
- ✓ Awarded bid amount: NRs. 4,712,805.35
- ✓ % below:- 0.33 % below than the estimated amounts
- ✓ Bid evaluation team of IDD, Okhaldhunga submit the bid evaluation report to the RID, Biratnagar, and approved the bidding procedure on 29 September 2012.
- ✓ ADB sent the concurrence letter for the awarding the bid of the project on 27 October 2011
- ✓ Agreement date: 27 November 2011

✓ Completion date: 19 February 2013 (15 months from date of agreement)

✓ Completed date: 16/12/2013

Table 12: Construction Summary

Amount	Contract Date	Work completion date	Work completed date	Time extension if	Causes of time extension
4,712,805.35	27/11/2011	19/02/2013	16/12/2013	10 months	Heavy rain, blockage of the road, strike

Source: IDD, Okhaldhunga

The tender notice published date of the work was 21 June 2011. The least financial quoted contractor was selected from the technically capable contractor. The agreement was done on 27/11/2011. The period for the procurement of the works was 5 months. This shows that the procurement procedure of the CMIASP is a lengthy process. Each bidding procedure should be approved by the ADB. In this case, ADB gave the consent letter after one month of a request sent to ADB.

6.2.9. Time extension procedure of the project: First-time extension

The contractor requested a time extension in IDD, Okhaldhunga on February 10, 2013. The causes of date extension for requesting the date extension quoting by the contractors are Heavy rain, strikes and landslide blockade of the road, and difficulty to transport the material. Total 70% of works were completed during the period contract period.

IDD, Okhaldhunga forwarded the time extension request to the RID, Biratnagar, and Director of RID, Biratnagar approved the time extension date up to June 19, 2013. The ADB gave the consent to the time extension on April 5, 2013.

6.2.10 Second time extension

The contractor requested the time extension in IDD, Okhaldhunga on June 03, 2013. The causes of date extension for requesting the date extension quoting by the contractors are Heavy rain, strikes and landslide blockade of the road, and difficulty to transport the material. Total 70% of works were completed during the period contract period.

IDD, Okhaldhunga forwarded the time extension request to the RID, Biratnagar, and Director of RID, Biratnagar forwarded the request to the DOI and the DG approved the time extension date up to December 19, 2013. The decision date of time extension was December 13, 2013. The ADB permitted the time extension on October 20, 2013.

This shows that the time extension process is also lengthy. The contract ended on April 5, 2013, and the time was extended on December 13, 2013. The time was extended to December 19, 2013. This shows that there was a 6-month void period of the contract.

Monitoring, evaluation, and reporting of the project

From the data obtained by the IDD, Okhaldhunga, IDD, Okhaldhunga formed the monitoring and supervision team under the command of the engineer. This team is responsible for quality control, monitoring the construction work, and reporting to the IDD, Okhaldhunga.

From the focused group discussion and key informant interview with WUA members, it was found that the WUA had formed 4 numbers of supervision teams for the monitoring of the project construction. The main objective of this team was to monitor the regular progress of the construction, the quality of the project construction, and report to the IDD, Okhaldhunga. This group also monitored the project jointly with the monitoring and supervision group formed by the IDD, Okhaldhunga. The IDD, Okhaldhunga report the progress to the ISPM consultant.

6.2.11 The WUA had divided the canal into 4 segments

Segment one 'A': Upper reach of the canal (Intake to above peltry set) Segment two 'B': Upper mid canal (Peltric set to Masar dada) Segment three 'C': Lower mid canal (Masar dada to Birouta Khola) Segment four 'D': Lower reach of the canal (Birouta Khola to the tail of canal)

In each segment, one subcommittee of three-member was formed and they were responsible for the labor-management quality and progress supervision of the project construction. This subcommittee could monitor the quality of the contractor's work and report to the IDD, Okhaldhunga. The organizational structure for the WUA executive committee, construction subcommittee, and monitoring and supervision subcommittee is

shown in the figure below. This was helpful for easy mobilization of resources and this procedure improved the quality of construction work.

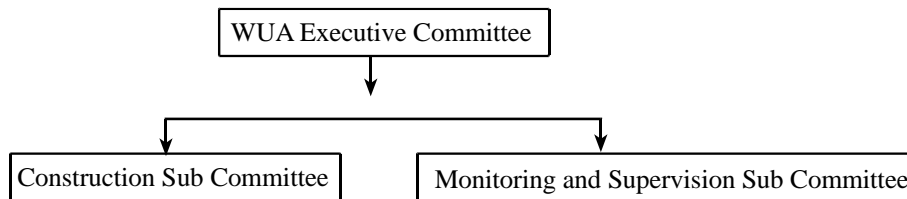


Figure 4: WUA organizational structure for project implementation

6.2.12 Infrastructure Completion and Handover

The contractor completed the construction of the project on 2070/09/01. From the data obtained from the IDD, Okhaldhunga, the contractor registered the letter of completion of the project on 2070/09/01. The final payment of the project was released after the conduction of the test run. The final payment was received by the contractor on 13/03/2014. The project was handover to the WUA in the presence of a member of the District Agricultural Development Office, representative of contractor and staff of IDD, Okhaldhunga after a successful test run of the canal on the day of 04/03/2014.

6.2.13 Regular Monitoring

After the completion of the project, there is no support from the CMIASP. The fainters are responsible for regular monitoring. WUA regularly kept the record of WUA activity, regularly audit the financial activity and renew WUA in IDD, Okhaldhunga.

7. CONCLUSION

The project management methodology of the Lipe Khola Baseri Irrigation Project had followed the CMIASP project management methodology. The project was need-based. Proper farmers' participation was ensured in each procedure of the project management. Farmers had strongly participated in the formation of WUA, detail survey, construction, and monitoring work. The implementation procedure involved WUA in the construction, monitoring, and supervision of the irrigation system. The project had gone through a time overrun. Quality construction was ensured during the construction of the project. The permanent structure was functioning well but need well maintenance. WUA was formed with the participation of the majority of farmers and registered in IDD, Okhaldhunga district. The project management methodology of the Lipe Khola Baseri Irrigation Project has followed the CMIASP project management methodology. The project is need-based. The subproject is selected due to the great willingness of farmers toward the project. Strong participation of the farmers is found in all the project management procedures. Farmers had contributed 38.77% more contribution works than agreement work which proves the willingness toward the project. All the stakeholders are involved in the selection of the project which causes the delay (each individual had to be involved, many parties had to be consulted) in project selection. This project took 22 months to select. Some weakness is found during the implementation of the project. Defect in the construction schedule and resource management during construction result in the time overrun of the project. Involvement of the two-party for the construction work of the same chainage affects the delay in work of one party to another party. The design of the project is done after discussion with farmers which gives the proper knowledge about the function of the structure used in the system to the farmers. Monitoring and supervision by the monitoring and supervision team ensure the quality of construction work.

8. RECOMMENDATION

Following are the research issue that needs to be conducted further in the same project.

To analyze the structural performance of the physical structure and institutional performance of Water Users' Association through water use activities, structure control activities, and organizational activities of the system.

iii. To examine the effect of the Irrigation Project on change in cropping intensity, cropping pattern, crop yield, and productivity of project area.

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