Journal of Advanced Research in HR and Organizational Management
Volume 6, Issue 1 - 2019, Pg. No. 1-15
Peer Reviewed

Research Article

Assessment of Performance of Functional and Partial Functional Water Supply Systems in Sunsari District of Nepal

Anjay Kumar Mishra[1], Arun Kumar Karna[2], Narayan Dhakal[3], Tulika Jha[4]

[1]Management Consultant at Beton Infratech LLP, Pune, India and Visiting Faculty at Shanker Dev Campus, TU. Kathmandu, Nepal.
[2]Engineer, Water Supply and Sanitation Division Office, Jhapa, Nepal.
[3]Vice Principal, Lumbini Engineering Management and Science College, Rupandehi, Nepal.
[4]Advocate, Dejure Law Firm, Anamnagar, Kathmandu.
DOI: https://doi.org/10.24321/2454.3268.201901

I N F O

Corresponding Author:
Anjay Kumar Mishra, Beton Infratech LLP, Pune, India and Shanker Dev Campus, TU. Kathmandu, Nepal.
E-mail Id:
anjaymishra2000@gmail.com
Orcid Id:
https://orcid.org/0000-0003-2803-4918
How to cite this article: Mishra AK, Karna AK, Dhakal N et al. Assessment of Performance of Functional and Partial Functional Water Supply Systems in Sunsari District of Nepal. *J Adv Res HR Organ Mqmt* 2019; 6(1): 1-15.

Date of Submission: 2019-01-12
Date of Acceptance: 2019-02-07

A B S T R A C T

Only 25.4% of water supply projects are fully functional in Nepal though the target of government is to provide access to safe water supply and sanitation facilities for all. Therefore a study for comparing the performance of the functional (Itahari) and partial functional (Duhabi) water supply and sanitation project after management transfer is needed to assess the indicators to improve the status of water supply and sanitation projects. Both the projects are of Sunsari district.

Purposive Sampling technic was applied based on sample size of central limit theorem. Scheduled Questionnaire Survey, Expert Consultation, Focus Group Discussion and Water Sample Test were done for primary source of data whereas reports. Journals, project reports, similar studies, books, websites and audit reports were reviewed for secondary source of data. Comparative performance of both the projects was analyzed based on technical, financial and institutional indicators. From the study it was found that pressure of flow, water demand of users, chlorine demand, and quick response of staffs, water quality and open defecation free were maintained at Itahari whereas such features were lacking in Duhabi Water Supply and Sanitation Project. It was found high tariff rate, timely payment and a business plan of Itahari WSSP was better resulting into better financial performance of the system in comparison to that of Duhabi.

Based on policy in both water supply and sanitation projects 33% of women along with a vital post and marginalize group based on service area representation were found. In Itahari Water Supply Project, for per thousand of connection 3.66 staffs were appointed whereas in partial functional Duhabi Water Supply System 1.91 staffs were found for per thousand connections. Itahari WSSP had maintained a citizen charter, complaint box, information system, detailed design report, As Built Drawings, Standard Operating Process and project information's were documented which causes the management of the system effective for implementation of reliable and satisfactory of the system whereas these things need to be improved in case of Duhabi for creating the confidence about the service.

Keywords: Technical, Financial, Institutional, Water Quality, Community

Introduction

In Rural Water Supply and Sanitation sector, over the last two decades, responsibility for service provision gradually moved from national government to local community. Community management became the prominent concept in this sector. All WASH agencies recognized it as a key concept. It started with community contribution, gradually developed itself into community involvement, then to community participation and ultimately to community management. Nepal's National Policy on Rural Drinking Water Supply and Sanitation (2004) provides guidance on water and sanitation service provision in rural areas using community led participatory approaches. The policy has recognized community management as a key concept. The Nepalese Rural Drinking Water Supply and Sanitation policy provided favorable policy environment for demand-driven community management, based on empowerment of the community to ensure their full participation in all stages of the project cycle, community's ownership of the assets through Water Users and Sanitation Committee and full responsibility of Operation and Maintenance with the community (GON, 2004).With such impressive achievements and changes that community management brought in the community, along with lowering stress to the government treasury, the WASH professionals failed to realize the limiting strength of the community. Nepal's WASH sector also suffers from this overestimated trust on community. The recent status survey reports of nearly 38,000 community managed projects in Nepal, published by the National Management Information Project (NMIP) of the Department of Water Supply and Sewerage (DWSS), show that only 25.4% of the projects are fully functional, others have some degree of poor functionality (DWSS/ NMIP, 2014).

In the same way, there are 31 water supply and sanitation projects in Sunsari district are handedover (management transferred) to the WUSC till now. As the NMIP data show that only 25.4% of the projects are fully functional, Sunsari district also has been facing the same problem of functionality in water supply system i.e. only 32.3% of water supply project are functional. Remaining are partial functional. So the study is necessary to identify these problems and their improvement.

Overall Objective

The overall objective of the study is to identify the technical, financial and institutional differences of functional and partial functional water supply systems.

Emperical Review

Performance of construction is not satisfactory in terms of time in Nepal (Mishra and Bhandari, 2018). The health facilities at the construction site for causal workers are missing (Mishra and Sharestha, 2017). Mishra and Rai (2017) also compared the different types of building and found performance should improve. Similar, might be the case for water supply which is confirmed by the study conducted by Mishra and Acharya (2018) for Salyankot Water Supply Project of Dhading District shows that the present physical structures are in satisfactory condition having index of 56.81% and before earthquake was found good having index 95%, was in good condition taking 10 indicators. Due to no flow of water from three sources after source get depressed and decrease in water for remaining three water source after earthquake, demand is more than supply. The quality of water has found within the prescribed range of National Drinking Water quality System based on physical, chemical and microbiological parameters. From the study it is concluded that the accessibility of the people to the stand post in average is good. The average distance for the beneficiaries HHs and the stand post is less than 100m. The system focuses on equality rather than equity without considering the family size. Operation and maintenance of the project lacks in terms of conducting timely general assembly, users meeting, record keeping, tariff collection, gender equity and social inclusion. It depends on VDC offices, District Development Office (DDC) and WSSDO Dhading for operation and maintenance due to lack of its own sufficient fund as O& M fund shortage of 27,280 for fiscal year 072-73. According to Mishra (2018), Salyankot Water Supply Project is presently functioning with current Functionality index of 58.4%. For the condition before earthquake it is found that this project was running properly with the functionality index of 71%. According to Mishra(2018), the conventional practices used in the design process of a project are best and no other techniques should be followed in the design process is assumption of professional rather than using Value Management. Though according to a survey conducted by Mishra (2018) on Existing Class A Construction Companies ware much more capable in terms of HR (Numbers, Experience & Projects Handled).

Methodology

First of all problems were identified and then generated the research questions and objectives. Primary and secondary data were collected by different sources.

Study Area

Sunsari district was taken for study area because Sunsari district has mixed community and it is near to the Indian boarder also. There are 31 rural water supply projects managed by WUSC in Sunsari district. As NMIP data shows that there are 25.4% of water supply projects are functioning well, the rural water supply project of Sunsari district also face such functioning problem. Among them only two projects were taken as sample. One of them was

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Itahari water supply project which was functioning well and another was Duhabi water supply project which was less functioning with a view to assess what was differences in their functionality status. Management transfer of the same system has been studied by Mishra and Krna (2019) and concluded that the system was lacking community acceptance in Duhabi whereas in Itahari community acceptance level was high. The systems were not accepting standard process and even lacking its financial sustainability and open defecation was more in case of Duhabi whereas these problems were less in Itahari WSSP. In this way the main causes of water supply system failure were worsening functionality, worsening water quality, information lost, lacking in standard process as well as financial sustainability and open defecation in service area.

Silent Feature

Table 1.Silent Features of the systems

Name of Project : Itahari Water Supply Project	Name of Project : Duhabi Water Supply Project
Date of Handover of Project : 2053/03/27	Date of Handover of Project : 2053/02/13
Benefitted Household : 11756	Benefitted Household : 3145

respondents were selected for scheduled questionnaire from both the projects to know their perception as this size is assumed to be standard for perception assessment. (Dhaugdel as cited in Thapa, 2015).

Data Collection

Primary and secondary data were collected through previous study, Questionnaires, Expert Consultation and Focus Group Discussion. Questions were made simple and mostly structured and semi-structured so that everyone can understand it easily without bias.

Primary Data

Expert Consultation, Focus Group Discussion and Questionnaires are the sources of primary data.

Expert Consultation

Experts were selected by judgmental sampling. SDE of WSSDO Sunsari, WASH Engineer of ITECO and Engineer of WSSDO, Sunsari were taken as expert team. Expert Consultation was conducted for generalize ideas.

Agendas of Expert Consultation

- About Technical Problems of WSSP
- About Software parts of WUSC
- About Administrative system of WUSC
- About Financial system of WUSC
- About O & M system of WSSP

Focus Group Discussion

Since the system has been covered more than 11 thousand household, seven FGD in Itahari Water Supply Project and six FGD in Duhabi Water Supply Project were conducted and collected the information for fulfillment of the objective.

Table 2.FGD in Itahari Water Supply Project

Community	Number of members	Date
WUSC Members	5	2073/01/08
Panchrukhi	7	2073/01/08
Jutbikashchauk	6	2073/01/08
B.P. Chauk	7	2073/01/09
Biratnagar line	5	2073/01/09
Aapgachhi	6	2073/01/10
WUSC maintenance staffs	4	2073/01/10

In Itahari Water Supply Project, first of all, the service area was divided in five clusters. One FGD from each cluster was conducted for gathering information. One FGD from WUSC members and another one FGD from WUSC maintenance Staffs were conducted.

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Table 3.FGD in Duhabi Water Supply Project

Community	Number of members	Date
WUSC members	5	2073/01/24
Bus Stand	6	2073/01/24
Rastriya Banijya Bank	6	2073/01/25
Sukumbasi Tole	5	2073/01/25
Buddha chauk	7	2073/01/26
WUSC staffs	4	2073/01/26

In Duhabi Water Supply Project, first of all, the service area was divided in four clusters. One FGD from each cluster was conducted for gathering information. One FGD from WUSC members and another one FGD from WUSC Staffs were conducted.

Agendas of FGD

- Technical Issues
- Quality Issues
- Administrative Issues
- Financial Issues
- ODF
- Information System

Questionnaire

Objective type questionnaires were used for data collection. Three sets of questionnaires were prepared for the three groups of targeted respondents separately as follows.

- Set I:- Questionnaire for Water Users (the Beneficiaries).
- Set II:- Questionnaire for WUSC (Member of WUSC).
- Set III:- Questionnaire for WSSDO (WSST, Engineer and SDE of WSSDO).

Table 4.Total number of Targeted Respondents

S.No.	Targeted Respondent	No. of Targeted respondent	No. of project	Total Targeted Respondent
1	Water Users	22	2	44
2	WUSC (member of WUSC)	6	2	12
3	WSST, Engineer and SDE of WSSDO	4		4
	Total			60

Questionnaires for Water user, WUSC, WSSDO were prepared in English and at the time of questionnaire survey the same were asked in Nepali language when they do not understand the questions.

Quality Test

Four water samples (source, RVT, Tap1 and Tap2) in each project were tested in Eastern Region Water Quality Testing Laboratory, Itahari. The report was used as a primary data.

Secondary Data

Reports Journals, Project Reports, Similar studies, Books, Websites provides baseline information of secondary data. Audit reports of Itahari Water Supply Project and Duhabi Water Supply Project were taken as secondary data.

Data Compilation and Analysis

As mentioned above, this study was mainly based on descriptive and analytical techniques for analyzing different objectives of the study. Hence, after completion of collecting required data, the data were presented in tabular form in clear and logical manner. Information obtained from respondents were analyzed with the help of simple statistical tools and technique like percentage method. As far as possible the results obtained after analysis was represented in graphical form.

Results and Analysis

Technical, Financial and Institutional Differences of the Systems

Technical Differences

A. Functionality Status

- **Demand Fulfillment**

Results obtained from Questionnaires shows that majority respondents of Itahari WSSP are more satisfy in water demand fulfillment than Duhabi WSSP i.e. the Itahari WSSP are more functional. The result was verified by Focus group Discussions and Field Observations.

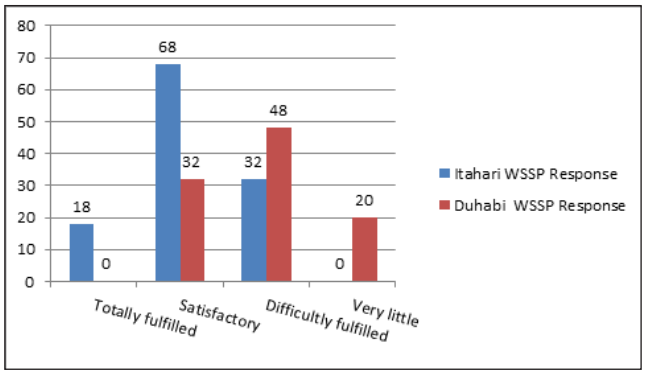

Figure 1.Percentage of respondents about water demand fulfillment

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

In Itahari Water Supply Project, the system was extended and modified to meet the water demand due to the high population growth rate. Additional two 450 cum OHT and four Deep Tube well were constructed to fulfill the demand of the system. The water users and elected members are positively support the systems.

In Duhabi Water Supply Project, existing two Deep Tube wells were failed. Only one Deep Tube well are functioning. The system was not extended and modified up to 2070 BS due to unavoidable political situation. The increased water demand could not be supplied through the existing lesser diameter pipes. The WUSC did not have any plan for supplement of these failure Deep Tube wells. The water users also could not trust about the systems.

- **Pressure Maintenance in the systems**

Results obtained from Questionnaires shows that 61% of respondents were satisfied of pressure in Itahari WSSP whereas only 14% of respondents were satisfied in Duhabi WSSP. Majority of respondents said that pressures have been deteriorating from beginning in Duhabi WSSP and Itahari WSSP did not face such problem. The result was verified by Focus group Discussions and Field Observations.

thatabout 23% of respondents agreed that the staffs immediately repaired the system and about 50% agree that staffs repaired the system within one or two days in Itahari WSSP whereas in Duhabi WSSP nobody agreed that staffs immediately repaired the system and only 33% of respondents agreed that the system repaired within one or two days. The result was verified by Focus group Discussions and Field Observations.

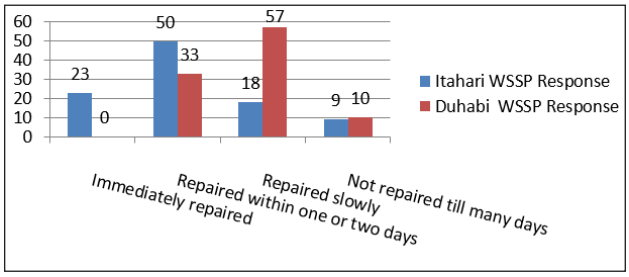

Figure 2.Percentage of respondents about maintenance of WSSP

In Itahari Water Supply Project, there are 43 permanent staffs and 10 temporary staffs. They are motivated and dedicated about their duties. Due to the systematic information system, if any problems were seen in the system, the staffs quickly respond and problems were solved as soon as possible.

In Duhabi Water Supply Project, there are only 6 permanent staffs and 3 temporary staffs. They are less motivated and dedicated about their duties. If any problems were seen in the system, the staffs could not be responded quickly.

Table 5.Satisfaction of response about pressure in WSSP

S. No.	Category of Respondents					Duhabi WSSP Response				Remarks
		No. of response	Satisfied	Not satisfied	Neither satisfied nor dissatisfied	No. of response	Satisfied	Not satisfied	Neither satisfied nor dissatisfied	
1	Water Users	22	14	5	3	22	3	12	7	
2	WUSC	6	3	2	1	6	1	4	1	
Total		28	17	7	4	28	4	16	8	
% of response		100	61	25	14	100	14	57	29	

In Itahari Water Supply Project, the pressure of the system was checked regularly. The water pressure remained same from beginning. When the water pressure was deteriorating, the management took action for finding the solution. There are 43 permanent staffs and 10 temporary staffs. They are motivated and dedicated staffs. The supervision of the system was done regularly.

In Duhabi Water Supply Project, since water demand was not fully fulfilled by the system, water pressure was not in priority. The water pressure problems were found from beginning. The water pressure of the system was not checked.

- **Staffs Response for Maintenance of the Systems**

Results obtained from Questionnaires it was found

- **Response of WSSDO Staffs about pressure testing in the systems**

Results obtained from Questionnaires of WSSDO Staffs, it was found that pressure was tested in Itahari WSSP where as in Duhabi WSSP whole respondents disagree about pressure testing in the system. The result was verified by Focus group Discussions and Field Observations.

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

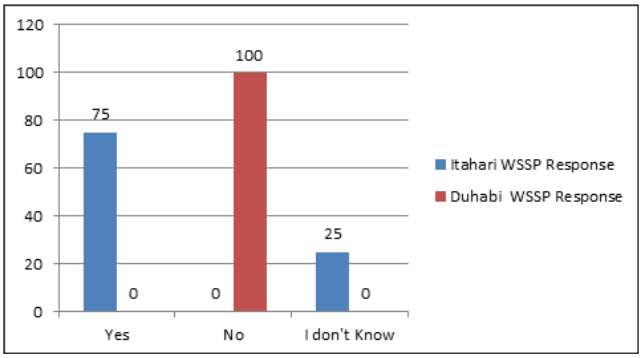

Figure 3.Percentages of respondents of WSSDO about pressure testing

In Itahari Water Supply Project, the pressure of the system was checked before handover of the system. Water pressure at critical position of different cluster were tested and verified as design.

In Duhabi Water Supply Project, the pressure of the system was not checked before handover of the system. The contractor just constructed the component and laid the distribution pipes as set in the engineering design. Water pressures at critical position of different clusters were assumed as design.

B. Water Quality Status

Four water samples (source, RVT, Tap1 and Tap2) of each system were tested in Eastern Region Water Quality Laboratory, Itahari. The different parameters of water samples are shown in the table.

- **User's Response about Suffering Diarrheal Diseases in the Systems**

Results obtained from Questionnaires it was found that 64% of respondents were not suffered with diarrheal diseases in Itahari WSSP whereas only 14% of respondents of Duhabi WSSP were not suffered with diarrheal diseases. Majority of respondents of Duhabi WSSP were suffered with diarrheal diseases. The result was verified by Focus group Discussions and Field Observations.

Table 6.Water Quality Test Report

S.No.	Parameters	Observed Values in Duhabi WSSP				Observed Values in Itahari WSSP				NDWQS, 2062 BS
		Source	RVT	Tap1	Tap2	Source	RVT	Tap1	Tap2	
1	Turbidity (NTU)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	5 (10)
2	pH	7.5	7.8	8.0	7.8	7.4	7.3	7.5	7.2	6.5 - 8.5 *
3	Electrical Conductivity (µs/cm)	704	685	669	671	585	685	680	566	1500
4	TDS(mg/L)	352	342	335	336	310	344	340	283	1000
5	Faecal coliform *E.coli*(CFU/100 ml)	0	0	0	**3**	0	0	0	0	0
6	Color, Taste & Odor	No	No	No	No	No	No	No	No	No
7	Free Residual Chlorine (mg/L)	Nil	Nil	Nil	Nil	.13	.1	0.1	0.15	0.1-0.2*
8	Total Hardness (mg/L as $CaCO_3$)	185	180	195	190	185	180	220	223	500
9	Iron (mg/L)	0.4	0.5	0.4	0.4	0.3	0.3	0..25	0.2	0.3 (3)
10	Calcium (mg/L)	40.5	45	45	40.75	65.3	75.5	60.9	61	200
11	Arsenic (mg/L)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05

APHA*: American Public Health Association, Standard Methods for Examination of Water & Waste Water*

** These values show lower and upper limits.*

() Values in parentheses refer the acceptable values only when alternative is not available.

Table 7.Response about suffering of diarrheal diseases

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Many times	Sometimes	No	No. of response	Many times	Sometimes	No	
1	Water Users	22	**2**	6	14	22	4	15	3	

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Total	22	**2**	6	14	22	4	15	3	
% of response	100	9	27	64	100	18	68	14	

In Itahari Water Supply Project, they have own laboratory. Water samples of different clusters are tested regularly. The water quality test report also indicated that all the parameters of water were within the range of Nepal Drinking Water Quality Standard 2062. So the respondent's opinions also verified. There was no risk of diarrheal diseases.

In Duhabi Water Supply Project, they have no water testing kit. So the water samples of different clusters were not tested. The water quality test report indicated that most of the parameters of water were within the range of Nepal Drinking Water Quality Standard 2062 but in Tap2 three *E.Coli* were found. Since there was no *E.Coli* found in source and RVT, it indicated that there might be leakage in the system. E Coli entered in the pipe through that point. So the respondent's opinion was also verified in some extent.

- **Response of WUSC members about fulfillment of chlorine demanding the systems**

Results obtained from Questionnaires it was found that 67% of the respondents agreed that they fulfilled chlorine demand in Itahari WSSP whereas only 17% of respondents agreed that they fulfilled chlorine demand in Duhabi WSSP. It indicated that the users of Itahari WSSP more satisfied about water quality than the users of Duhabi WSSP and thus water quality played the important role in functionality. The result was also verified by Focus group Discussions and Field Observations.

Itahari WUSC has been found very conscious of the public health. To ascertain the quality of drinking water supplied to the consumers WUSC regularly monitors the quality of water purified through conventional treatment followed by disinfection. It conducts tests and analysis of 5 physicochemical parameters of treated water at distribution point everyday throughout the year. These 5 quality parameters include turbidity, pH, color, iron and residual chlorine. WUSC also conducts residual chlorine test of household tap water samples on monthly basis, and when and where required on need basis. The water quality test report also indicated that there was residual chlorine in water samples. All the parameters of water were within the range of Nepal Drinking Water Quality Standard 2062. So the respondent's opinions also verified.

In Duhabi Water Supply Project, they have no water testing kit. They used chlorine randomly in rainy seasons. According to the water quality test report, 3nos of *E.Coli* were found in Tap2.The presence of *E Coli* indicated that there was no residual chlorine in supplied water. So the respondent's opinion also verified.

- **Response of WUSC members about complaints of water quality**

Results obtained from Questionnaires of WUSC members shows that that majority of respondents of Itahari WSSP confident that they have no water quality complaints whereas in Duhabi WSSP majority agree that they have water quality complaints. The result was also verified by Focus group Discussions and Field Observations.

Table 8.Response about water fulfilled with chlorine demand

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	Sometimes in rainy season	No	No. of response	Yes	Sometimes in rainy season	No	
1	WUSC members	6	4	2	0	6	1	4	1	
Total		6	4	2	0	6	1	4	1	
% of response		100	67	33	0	100	17	67	17	

Table 9.Response about complaints of water quality

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	Sometimes	No	No. of response	Yes	Sometimes	No	
1	WUSC members	6	0	3	3	6	3	2	1	

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Total	6	0	3	3	6	3	2	1	
% of response	100	0	50	50	100	50	33	17	

Itahari WUSC has been found very conscious of the public health. To ascertain the quality of drinking water supplied to the consumers WUSC regularly monitors the quality of water purified through conventional treatment followed by disinfection. So Itahari Water Supply Project has not complaint about water quality.

According to the water quality test report in Duhabi Water Supply Project, 3nos of *E.Coli* were found in Tap2. The presence of *E Coli* indicated that Duhabi WUSC has not very conscious about the public health. So Duhabi Water Supply Project has complaint about water quality many times.

C. Status of O.D.F

- **Response about Declaration of ODF**

Results obtained from Questionnaires it was found that 100% of respondents of Itahari WSSP said that service area declared ODF whereas in Duhabi WSSP some area remained to declare ODF. The result was also verified by FGD and Field Observations.

In terai region most of the area become water logged in rainy season, open defecation weakens the confidence over the system. Since Itahari declared ODF, the users of Itahari Water Supply Project have high confidence level than Duhabi Water Supply Project.

- **Response about Children and Elderly Person Defecation**

Results obtained from Questionnaires it was found that 100% of respondents of Itahari WSSP said that children and elderly person defecate in toilet whereas in Duhabi WSSP only about 50% of respondents said that children and elderly person defecate in toilet. The result was also verified by FGD and Field Observations.

Since Itahari Water Supply Project declared ODF, all the users including children and elderly person used toilets whereas in Duhabi Water Supply Project, all the users did not have toilets. In Sukumbasi Tole, the users have less land. So they did not have land for toilets. The open defecation is also due to the multiple causes such as cultural practice, being captive of their tradition and deterring changes is the main cause of open defecation.

Financial Differences

- **Income Expenditure Status**

Data on F.Y. 2070/71 Audit Report of Duhabi Water Supply Project and Itahari Water Supply Project are tabulated in Table.

Table 10.Response about declaration of ODF

S. No.	Category of Respondents	Itahari WSSP Response			Duhabi WSSP Response			Remarks
		No. of response	Yes	No	No. of response	Yes	No	
1	WUSC members	6	6	0	6	0	6	
2	WSSDO staffs	4	4	0	4	0	4	
Total		10	10	0	10	0	10	
% of response		100	100	0	100	0	100	

Table 11.Response about children and elderly person defecation

S. No.	Category of Respondents	Itahari WSSP Response			Duhabi WSSP Response			Remarks
		No. of response	In toilet	Sometimes in field	No. of response	In toilet	Sometimes in field	
1	WUSC members	6	6	0	6	3	3	
Total		6	6	0	6	3	3	
% of response		100	100	0	100	50	50	

Table 12.Duhabi & Itahari WSSP Income Expenditure Status

Description	Duhabi WSSP	Itahari WSSP	Remarks
Total Income per Year , Rs.	5322994.69	66764316.82	

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Total Expenditure per year, Rs.	4761782.51	63149299.83	
Total Saving per year, Rs.	561212.18	3615016.99	

Source: F.Y.2070/71 Duhabi & Itahari WSSP Audit report

Total annual income of Duhabi WUSC in F.Y. 2070/71 was Rs. 53,22,994.69 which are collected through water tariff, tap connections and fine and total annual expenditure was Rs. 47,61,782.51.Total annual saving was Rs. 5,61,212.18.

Total annual income of Itahari WUSC in F.Y. 2070/71 was Rs. 6,67,64,316.82 which are collected through water tariff, tap connections and fine and total annual expenditure was Rs. 6,31,49,299.83.Total annual saving was Rs. 36,15,016.99.

- **Response about Tariff**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they pay tariff in timely and they agreed the rate of tariff was high whereas in Duhabi WSSP majority of respondents said that they paid the tariff sometimes delay and agreed the rate of tariff is just right. The result was also verified by Focus group Discussions and Field Observations.

Itahari WUSC has applied tariff structure on a linear volumetric basis where up to 10 m^3 are fixed as minimum tariff with fixed charge Rs. 120 and on the consumption above to that linear volumetric tariff is applied. On the consumption between 10 m^3 to 20 m^3 of water per connection, additional Rs. 20 per m^3 is to be applied. On the consumption between 21 m^3 to 30m^3 of water per connection, additional Rs. 27 per m^3 is to be applied. On the consumption between 31 m^3 to 50 m^3 of water per connection, additional Rs. 32 per m^3 is to be applied. On the consumption between 51 m^3 and above use of water per connection, additional Rs.37 per m^3 is to be applied. Since Itahari WUSC has been found very conscious of the public health and satisfactory water supply service, the users were motivated and they trusted about the system. They paid tariff in time and they did not have objection about relatively high rate tariff.

Duhabi WUSC has also applied tariff structure on a linear volumetric basis where up to 10 m^3 are fixed as minimum tariff with fixed charge Rs.100 and on the consumption above to that linear volumetric tariff is applied. On the consumption between 10 m^3 to 30 m^3 of water per connection, additional Rs.16 per m^3 is to be applied. On the consumption between 31 m^3 to 60 m^3 of water per connection, additional Rs.20 per m^3 is to be applied. On the consumption between 61 m^3 and above use of water per connection, additional Rs.30 per m^3 is to be applied. Since Duhabi WUSC provided relatively poor water supply service, the users were not motivated and they did not trust about the system. They paid tariff sometimes delay and they had objection about tariff even the rate of tariff is lesser than Itahari Water Supply Project.

Table 13.Response about timely paying tariff

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	No	Sometimes delay	No. of response	Yes	No	Sometimes delay	
1	WUSC members	6	3	0	3	6	1	2	3	
Total		6	3	0	3	6	1	2	3	
% of response		100	50	0	50	100	17	33	50	

Table 14.Response about rate of tariff

S. No.	Category of Respondents	Itahari WSSP Response					Duhabi WSSP Response					Remarks
		No. of response	Less	Just right	High	Much High	No. of response	Less	Just right	High	Much High	
1	Users	22	0	8	12	2	22	3	13	6	0	
Total		22	0	8	12	2	22	3	13	6	0	
% of response		100	0	36	55	9	100	14	59	27	0	

- **Response of WUSC members about Business Plan**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they had business plan and they follow it whereas in Duhabi WSSP

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

majority of respondents said that they had not business plan. The result was also verified by Focus group Discussions and Field Observations.

and other committees formed to provide supports to the executive committee and management for effective and efficient service delivery and O&M of the facilities.

Table 15.Response of WUSC about business plan

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	Yes but not implemented	No	No. of response	Yes	Yes but not implemented	No	
1	WUSC members	6	4	2	0	6	0	0	6	
Total		6	4	2	0	6	0	0	6	
% of response		100	67	33	0	100	0	0	100	

The Itahari WUSC had prepared business plan. The documents of business plan should generally have i) engineering plan which determines the capital investment required ii) Customer service plan which determines number of service connections and collections iii) Administrative Plan determines increase or decrease of staff and administrative costs iv) Financial plan which determines revenue, income and expenditures. They followed the business plan and thus their organization capacity increased day by day whereas the Duhabi WUSC had not prepared business plan yet.

Institutional Differences

A. Organizational Status

Itahari WUA is comprised of 284 elected members. From WUA members, 9 members including 3 female members elected for WUSC members through Election with 5 years tenure as per Statute of WUA. The committee is headed by a chairperson. Committee performs its day to day operation and maintenance activities through the employees appointed for the job. The 43 permanent staffs team of the employees headed by a manager includes technical, financial, administrative and supporting staff. The chairperson has the overall responsibility of management of the staff and coordination with the executive committee

Duhabi WUA is comprised of 57 elected members. From WUA members, 11 members including 3 female members elected for WUSC members through Election with 5 years tenure as per Statute of WUA. The committee is headed by a chairperson. Committee performs its day to day operation and maintenance activities through the employees appointed for the job. The 6 permanent and 3 temporary staffs team of the employees headed by a manager includes technical, financial, administrative and supporting staff. The chairperson has the overall responsibility of management of the staff and coordination with the executive committee for effective and efficient service delivery and O&M of the facilities.

B. Standard Process

- **Response of Users about provision of Citizen Charter and Complaints Box**

Results obtained from Questionnaires, it was found that majority of respondents of Itahari WSSP said that they had citizen charter and complaints box whereas in Duhabi WSSP majority of respondents said that they had no citizen charter and complaints box. The result was also verified by Focus group Discussions and Field Observations.

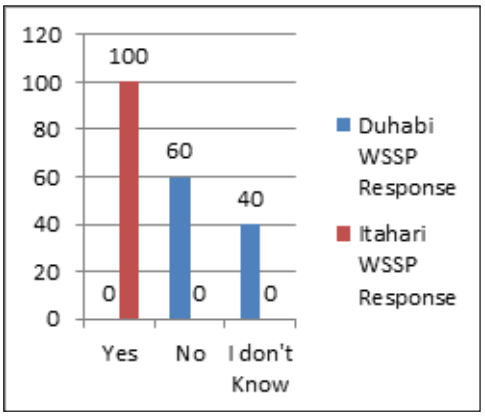

Figure 4.Percentage of response about citizen charter

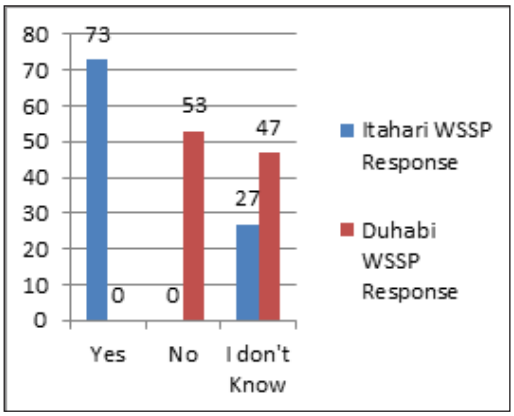

Figure 5.Percentage of response about complaints box

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Relation of WUSC with its consumers is captured by the number of consumer complaints and response time it takes to address the complaints, and perceptions of the consumers on the quality of service provided by WUSC. Complaints are commonly used as an indicator of the quality of interaction with consumers (WB, 2009b). Itahari WUSC has maintained a consumer complaints box in which all complaints of consumers and details of responses made to address the complaint are recorded by authorized personnel with date and time of complaint and responses. Similarly Itahari WUSC has maintained a citizen charter in which all the information related to water supply service is given. This makes the system transparent and users trust about the system. While interviewing users on focal group discussion, they are found fully satisfied with the services provided by the WUSC. They have no complaints on the quantity of water, and continuity or reliability of the water supply service. Quantity of water available through their taps in two shifts a day regularly is sufficient for their daily needs. People are fully assured on the quality of water supplied to them.

But Duhabi WUSC has not maintained a consumer complaints box and citizen charter. This makes the system less transparent and users trusting level are low about the system. While interviewing users on focal group discussion, they are less satisfied with the services provided by the WUSC. They have complaints on the quantity of water, and continuity or reliability of the water supply service.

- **Response of Users about self-understood of bill payment**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they self-understood about bill payment whereas in Duhabi WSSP majority of respondents said that they had no idea about bill payment. The result was also verified by Focus group Discussions and Field Observations.

Since Itahari WUSC has maintained a citizen charter in which all the information related to water supply service is given, anybody easily know about the bill payment process. That indicates the information system of Itahari Water Supply Project is better. This makes the system transparent.

Similarly there is lack of such information system, newly users face difficulty in bill payment process. This makes the system less transparent and users trusting level are low about the system also.

- **Response of Users about connection procedure of new tap connection**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they knew the new tap connection procedure whereas in Duhabi WSSP majority of respondents said that they did not know the new tap connection procedure. The result was also verified by Focus group Discussions and Field Observations.

Since Itahari WUSC has maintained a citizen charter in which all the information related to water supply service is given, anybody easily know about the new tap connection procedure. That indicates the information system of Itahari Water Supply Project is better.

Similarly there is lack of such information system, newly users face difficulty in the new tap connection procedure. That indicates the information system of Duhabi Water Supply Project is poor.

Table 16.Response about self-understood of bill payment

S. No.	Category of Respondents	Itahari WSSP Response			Duhabi WSSP Response			Remarks
		No. of response	Yes	No	No. of response	Yes	No	
1	users	22	13	9	22	8	14	
Total		22	13	9	22	8	14	
% of response		100	59	41	100	36	64	

Table 17.Rresponse about connection procedure of new tap connection

S. No.	Category of Respondents	Itahari WSSP Response			Duhabi WSSP Response			Remarks
		No. of response	Yes	No	No. of response	Yes	No	
1	users	22	17	5	22	9	13	
Total		22	17	5	22	9	13	
% of response		100	77	23	100	41	59	

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

- **Response of WUSC members about SOP when pressure low**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they had standard process when high/low pressure in some part of supply area whereas in Duhabi WSSP majority of respondents said that they did not have such process. The result was also verified by Focus group Discussions and Field Observations.

Quality of works conducted by the staffs of Itahari Water Supply Project is controlled by guidelines and manuals on O&M of facilities and equipment. WUSC has prepared such guidelines and manuals during capacity development with the help of program team and following accordingly after wards. Regular technical job processes are standardized through standard operating procedures (SOPs) to control accuracy and quality, and also to improve efficiency and effectiveness on the works. SOPs developed and followed by WUSC include SOP on O&M of water treatment plant, SOP on water quality management, SOP on water meter reading and meter calibration control, SOP on O&M of distribution facilities. They followed the steps given in SOP when the pressure at critical points fluctuated whereas the Duhabi WUSC had not SOP about such type of problems.

C. Information Status

- **Response about Detailed Design, Reports, As Built Drawings and SOPs**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they had detailed design, reports ,As Built Drawings and standard operating procedures(SOPs) for O&M whereas in Duhabi WSSP majority of respondents said that they did not have detailed design, reports, As Built Drawings and standard operating procedures(SOPs).The result was also verified by Focus group Discussions and Field Observations.

Table 18.Response about SOP when pressure low

S. No.	Category of Respondents	Itahari WSSP Response			Duhabi WSSP Response			Remarks
		No. of response	Yes	No	No. of response	Yes	No	
1	WUSC member	6	5	1	6	2	4	
Total		6	5	1	6	2	4	
% of response		100	83	17	100	33	67	

Table 19.Response about detailed design, reports

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	No	I don't know	No. of response	Yes	No	I don't know	
1	WUSC members	6	4	0	2	6	0	5	1	
2	WSSDO staffs	4	3	0	1	4	0	3	1	
Total		10	7	0	3	10	0	8	2	
% of response		100	70	0	30	100	0	80	20	

Table 20.Response about "As Built Drawings"

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	No	I don't Know	No. of response	Yes	No	I don't Know	
1	WUSC members	6	4	0	2	6	0	2	4	
2	WSSDO staffs	4	3	0	1	4	0	1	3	
Total		10	7	0	3	10	0	3	7	
% of response		100	70	0	30	100	0	30	70	

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

Table 21.Response about providing standard operating procedures(SOPs) for O & M

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	No	I don't Know	No. of response	Yes	No	I don't Know	
1	WSSDO staffs	4	3	0	1	4	0	2	2	
Total		4	3	0	1	4	0	2	2	
% of response		100	75	0	25	100	0	50	50	

In FGD with WUSC's members it was found that the Itahari WUSC had been involving actively in every stage on construction period of Itahari Water Supply Project. So they understood working principle of all the components which were constructed in the system. They knew the necessity of Design Report, As Built Drawings as well as SOP's documents. They demanded such type of documents in concern authority and they got it whereas in Duhabi Water Supply Project, the hasty situation of management transfer, the WUSC are not that much bothered of project documents. They only concerned in the supply of water and they did not demand such type of documents.

- **Response about Information Sharing**

Results obtained from Questionnaires it was found that majority of respondents of Itahari WSSP said that they provided information to new users committee whereas in Duhabi WSSP majority of respondents agreed that they have provided less information from existing WUSC.

According to the expert consultation and FGD with WUSC's members it is found that during the hasty situation of management transfer, the WUSC are not that much bothered of project documents. This information gradually fades out from the memory of WUSC members. But after several years when there are lots of changes in project features and there are new WUSC members this information is lost somewhere. Sometime the WUSC members who lose his election do not want to share this information. In Itahari Water Supply Project, they shared most of the information due to transparent information system whereas in Duhabi Water Supply Project, they shared relatively less information due to lack of systematic information system.

Conclusion

In Itahari WSSP, pressure of flow, water demand of users, chlorine demand, quick response of staffs, water quality and open defecation free were maintained whereas such features were lacking in Duhabi Water Supply and Sanitation Project.

It was found high tariff rate, timely payment and a business plan of Itahari WSSP was better resulting into better financial performance of the system in comparison to that of Duhabi.

In Itahari WSSP 3.66 staffs per thousand connections were appointed whereas in Duhabi WSSP 1.91 staffs per thousand connections.

Frequent meeting were conducted at Itahari WSSP which was lacking in case of Duhabi WSSP.

Itahari WSSP had maintained a citizen charter, complaint box, information system, detailed design report, As Built Drawings, Standard Operating Process and project information's were documented which causes the management of the system effective for implementation of reliable and satisfactory of the system whereas these things need to be improved in case of Duhabi for creating the confidence about the service.

Table 22.Response about information sharing

S. No.	Category of Respondents	Itahari WSSP Response				Duhabi WSSP Response				Remarks
		No. of response	Yes	Partially	No	No. of response	Yes	Partially	No	
1	WUSC members	6	2	1	2	6	0	2	4	
Total		6	2	1	2	6	0	2	4	
% of response		100	33	17	33	100	0	33	67	

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901

References

1. DWSS. *Design Guidelines for Community based Gravity Flow Rural Water Supply Schemes.* Kathmandu: 2003.
2. DWSS. *Welcome Page*. Retrieved January 155, 2013. from http://dwss.gov.np/content/1/Welcome.
3. DWSS/ NMIP. *Nationwide coverage and functionality Status of Water Supply and Sanitation in Nepal.* Kathmandu: NMIP. 2014.
4. GON. *National Policy on Rural Drinking Water Supply and Sanitation.* Kathmandu: GON. 2004.
5. MoPPW. *Rural Water Supply and Sanitation National Policy,* 2004. Kathmandu: Ministry of Physical Planning and Works (MOPPW). 2004.
6. NEWAH. (Website). *Cross Cutting Themes*. Retrieved from [Online]. Available at:http://newah.org.np/index1.php?option=information&id=28.
7. NMIP. *National coverage and fuctionality status of water supply and sanitation in nepal.* Kathmandu: DWSS. 2014.
8. Mishra AK, Acharya SR. Performance Assessment of Salyankot Water Supply Project in Post-Earthquake Scenario of Nepal. *J Adv Res GeoSci Rem Sens* 2018; 5(3&4): 23-40.
9. Mishra AK. Sustainability and Risk Assessment of Salyankot Water Supply Project in Post-Earthquake Scenario.*International Journal of Operations Management and Information Technology* 2018; 8(1): 1-30. Available at http://www.ripublication.com.
10. Mishra AK, Rai S. Comparative performance assessment of eco-friendly buildings and conventional buildings of Kathmandu valley", *International Journal of Current Research* 2017; 9(12): 62958-62973.
11. Mishra AK, Bhandari S. Performance Assessment of Ongoing Construction Projects under Town Development Fund, Nepal, *Int J Adv Res Civil Stru Engr* 2018; 1(1&2): 27-39.
12. Mishra AK, Shrestha M. Health and Safety Status of Casual Workers in Road Improvement Project Kathmandu Valley, Nepal, *International Journal of Engineering Technology Science and Research* 2017; 4(9): 1187-1199. www.ijetsr.comISSN 2394–3386.
13. Mishra AK. Assessment of Human Resource Capacity of Construction Companies in Nepal. J Adv Res Jour Mass Comm 2018; 5(4): 14-25.
14. Mishra AK. Implementation Status of Value Management in Project Management Practice in Nepal. *International Journal of Management Studies* 2019; 6(1): 92-108. DOI: http://dx.doi.org/10.18843/ijms/v6i1(1)/13.
15. Mishra AK, Karna AK. "Assessment of Management Transfer Process of Water Supply Systems in Sunsari District of Nepal."*International Journal of Research-Granthaalayah* 2019; 7(1): 1-24. https://doi.org/10.5281/zenodo.2550077.

ISSN: 2454-3268
DOI: https://doi.org/10.24321/2454.3268.201901