Global Development Network

Strengthening Institutions to Improve Public Expenditure Accountability

Cost-Effectiveness Analysis: Drinking Water Utilities in Belgaum City Corporation

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LIST OF ABBREVIATIONS

24/7	24 hours a day, 7 days a week
ADB	Asian Development Bank
AWWA	American Water Works Association
BCC	Belgaum City Corporation
CBPS	Centre for Budget and Policy Studies
CEA	Cost Effectiveness Analysis
CER	Cost Effectiveness Ratio
CGE	Compagnie Générale des Eaux
CMWS	Corporation Managed Water Supply
CSI	Customer Satisfaction Index
EI	Effectiveness Index
FGD	Focus Group Discussions
GDN	Global Development Network
GO	Government Order
GOI	Government of India
GoK	Government of Karnataka
HDMC	Hubli Dharwad Municipal Corporation
HHs	Households
HSC	House Service Connection
IDPMS	Indo-Dutch Project Management Society
IEG	Independent Evaluation Group
IFI	International Financial Institutions
INR	Indian Rupee
KUIDFC	Karnataka Urban Infrastructure Development and Finance Corporation
KUWASIP	Karnataka Urban Water Sector Improvement Project
KUWSDB	Karnataka Urban Water Supply and Drainage Board
LPCD	Liters per Capita per Day
MDG	Millennium Development Goal
MGD	Millions of Gallons per Day
MI	Morbidity Index
MLD	Million Liters per Day
MOU	Memorandum of Understanding
MoUD	Ministry of Urban Development
O&M	Operation and Maintenance
PIU	Project Implementation Unit
PMWS	Private operator Managed Water Supply
PPP	Public Private Partnership
PSP	Private Sector Participation
SLA	Service Level Agreement
SPV	Special Purpose Vehicles
Sq. km	Square Kilometer
UDD	Urban Development Department
ULB	Urban Local Body
UN	United Nations

UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN-HABITAT	United Nations Human Settlements Programme
USD	United States Dollar
WSQI	Water Supply Quality Index

ABSTRACT

Several debates surround the issue of private sector participation in the delivery of public services, especially with the central and state governments of India encouraging the trend in their water policies. With the proliferation of projects involving private sector participation in the water supply infrastructure sector and over USD 500 billion in investments predicted to flow into this sector, an analysis of these projects assumes importance. The present report is based on a cost-effectiveness analysis of drinking water utilities in the City Corporation of Belgaum, northern Karnataka. The corporation managed and private operator (Veolia water) managed water supply utilities were compared. In the former, data from household surveys was used to construct an effectiveness index model to analyze the costs and in the latter, data provided by the operators was used to compute an annual average operation and maintenance expenditure. A management aspect analysis framework was also developed to capture relevant information. In addition, a beneficiary needs assessment was conducted to justify the need for a 24/7 water supply. Results indicated that the private operator managed water supply utility was more cost effective; however, there was no significant difference in the combined effectiveness indices (which include indices such as mean outage frequency score and customer satisfaction score) of these two water supply utilities. It can be inferred that a choice cannot be made based only on the cost-effectiveness ratios of the two water supply utilities. An in-depth analysis of these utilities, addressing the management aspects, financial sustainability and the political economy of the projects will be useful. Consumers are looking for and are willing to pay for a reliable source of water supply, not necessarily a 24/7 supply; however, their ability to pay and equity issues also need to be considered.

Keywords: Public private partnership, PPP, private sector participation, PSP, 24/7 water supply, Belgaum City, Cost effectiveness analysis

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1. INTRODUCTION

1.1 Background and Literature Review

Water, "*the stuff of life and a basic human right*" (UNDP 2006), is perhaps the most sought after natural resource of the 21st century, after crude oil. With the demands of a burgeoning world population, especially in the developing nations (United Nations 2008), stress on water resources is increasing – more so for drinking water. The Millennium Development Goals (MDGs) of the United Nations, to which India is a signatory, envisages '*halving the proportion of population not having sustainable access to safe drinking water.*' The issue of safe drinking water has also a direct correlation with the larger question of health and nutrition indicators and is thus linked to health related MDGs. India has a long way to go in achieving these milestones. In terms of the availability of water, India is at 133rd position among 180 countries and as regards the quality of the water available it is 120th among 122 countries (UNESCO 2006).

Right to water is not enshrined in the Constitution of India as a fundamental right; however, Article 21 of the Constitution, which elicits 'Right to life' – and further Supreme Court rulings in this regard – establishes the prevalence of such a right implied (Muralidhar 2006). In line with this spirit, the national water policy (2002) and state water policy (of Karnataka) clearly indicate in their allocation priorities, in terms of usage, that the highest priority must be accorded to the supply of drinking water.
Water was primarily a state subject (Entry 17 of the List 2 of the Constitution in the Schedule 7). This gave the state the power to develop and manage water supply systems (Constitution of India 1950). But, with the 73rd and the 74th amendment of the Constitution, the responsibility of providing drinking water devolved to the local governments; it is now the duty of the state to enact laws to ensure that sufficient funds, functions and functionaries are made available to these local governments who are in the nascent stages of coming into their own.

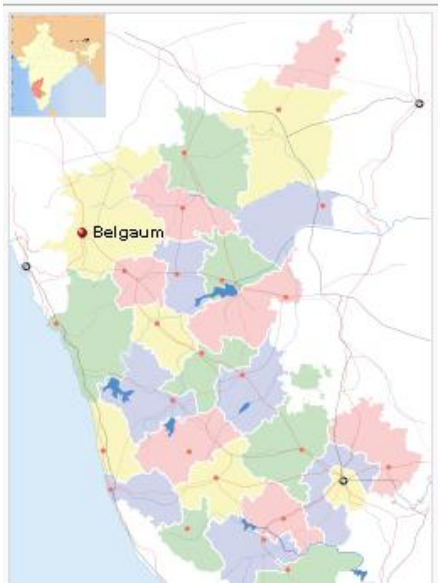
The Karnataka Urban Development Policy also envisages empowering these Urban Local Bodies (ULBs) by giving them more administrative, technical and financial powers and by doing away with development authorities[1] and water boards,[2] thus moving from the role or implementers to that of regulators, and building staff capacity at the local government levels.

The Government of Karnataka's (GoK) water policy also mentions increasing the private sector participation (PSP) in the water sector; this has become a very contentious issue in many other developing nations as well, especially with the International Financial Institutions (IFI) like the World Bank and the Asian Development Bank (ADB) advocating the notion of water as an economic good (ADB 2003). In an evaluation report by the Independent Evaluation Group (IEG) of the World Bank it was found that the World Bank lends USD 20 per capita on an average to water-poor countries like Haiti and Niger while it

[1] Development authorities take on the task of city planning, including planning and executing infrastructure projects, drafting new residential layouts, etc.
[2] The Karnataka Urban Water Supply and Drainage Board (KUWSDB) which was set up to carry out water supply works in all ULBs.

lends USD 180 per capita to water-rich countries like Belize (IEG 2007). This could probably indicate that investments are made based on the ability of the service provider to repay rather than the real need for water. Typically an IFI[3] lends money for infrastructure projects to the central government, which then on-lends the same to state governments or agencies (special purpose vehicles or SPVs) at the state level. These in turn on-lend to the local governments that are more often than not left out of the consultative process. In the end the local governments end up with a huge debt to recover from their citizenry who may or may not have the capacity to pay for their water needs (WaterAid 2007).

Figure 1.1: Location of Belgaum in Karnataka and India



For these reasons, there has been strong opposition to private sector participation in developing nations, where activists have cried foul about how the governments are selling water resources – considered a public good – to private players and also downplaying community participation while formulating water policies. In India alone, there has been a mushrooming of public private partnership (PPP) projects with over 64 PPP projects in around 44 cities in the water supply sector. There is a lot of expected investment from the private sector, as investing in such projects becomes lucrative for the private sector. This is being seen as a cause for concern by citizens and elected representatives alike, who believe that the private sector is in this for the medium term. Critics have pointed out that in the name of increasing efficiency, governments are shying away from their responsibility to provide sustainable supply of drinking water (Manthan 2010).

Given this background of ineffective decentralization, the mushrooming of PPP projects and the pressing issue of providing every citizen with sustainable access to safe drinking water supply by local governments, it becomes important to study and compare the water supply utilities being managed by the government and the private operators

[3] Loans from IFIs coming in for the water sector are predominantly of the variety which are pure loans with interest and repayment schedules ascertained through a tripartite agreement between the funder, the local government and the fund mobilizing agency.

through private sector participation. Insights gained from this study can provide valuable inputs to both policymakers and practitioners alike.

To investigate these issues further, the case of the 24/7 (24 hours a day, 7 days a week) water supply project and the corporation managed water supply in Belgaum City Corporation were chosen for the study.

The study is aimed at conducting an economic analysis under these two management models (corporation managed and private operator managed water supply) to ascertain which is more cost effective, while at the same time looking at the best practices of these utilities under the public and private management systems.

1.2 Project information

Belgaum district, the fourth largest district in Karnataka,[4] is located in northern Karnataka, bordering the states of Maharashtra and Goa (Figure 1.1). Belgaum has an average rainfall of about 808 mm (Wikipedia 2010) annually (the state average being 1035 mm) with a substantial water table.

As per the 2011 Census, Belgaum City Corporation (BCC) situated in Belgaum Taluk, has a population of about six lakhs. It is one among the seven city corporations in the state of Karnataka and the largest in northern Karnataka. The town is situated nearly 2,500 feet (762 m) above sea-level. Each of the 58 wards in Belgaum City Corporation has an elected councilor; together they form the City Council.

Urban Population	:	610,189
City Area	:	94 Sq. km
No. of Wards	:	58
No. of Properties	:	80,456
Length of Road	:	615 km

The executive branch of this city council is headed by the Corporation Commissioner, a bureaucrat. The city council elects a Mayor who heads the legislative wing. The City Commissioner has a host of personnel working in different departments, including the water supply department.

1.2.1 Water supply management in Belgaum City Corporation

A unique situation exists in Belgaum, where both the public managed and private operator managed drinking water supply utilities exist side by side, giving one an opportunity to study the differences between the two water supply utilities that operate

[4] India is a federal constitutional republic with a parliamentary democracy consisting of 28 states and seven union territories. Each state is further divided into a number of districts. Local governments exist at the sub-district level. There are both urban and rural local governments.

under similar conditions within the same City Corporation limits. Given this arrangement it becomes easier to devise a method to draw comparisons between the drinking water supply systems under different systems of management. It also allows us to determine the critical success factors for effective implementation of drinking water supply through public management.

a. Corporation managed water supply (CMWS)

The management of the water supply and distribution was under the Belgaum City Corporation from the time of its inception, with technical assistance from Karnataka Urban Water Supply and Sanitation Board (KUWSDB). In 2006, the Operation and Maintenance (O&M) of the water supply system was also handed over to KUWSDB and a memorandum of understanding[5] (MOU) was signed to this effect. Reasons cited for this handing over were mismanagement and improper management of water distribution (Raghavendra 2010). Other than Belgaum City, KUWSDB also handles the operation and maintenance of the water supply system in six other urban local bodies (KUWSDB 2008-09) as per government orders.

Once the KUWSDB took over, a new sub-division was opened in Belgaum, and nine more engineers were appointed. Personnel engaged in water supply were transferred to KUWSDB's Belgaum Division. However, the ownership of the assets still remained with Belgaum City Corporation.

The details of the key stakeholders of the corporation managed water supply are provided in Annexure I.

What is 24/7 water supply?

24/7 water supply ensures that there is water available in the house service connection (HSC) throughout the day at a constant, specified pressure. The distribution system is continuously full and under positive pressure.

To achieve such a target, the water supply network needs to be refurbished by incorporating pressure valves and augmenting bulk water supply with other technologies.

b. Private operator managed water supply (PMWS)

In 2007, through a World Bank loan and with the assistance of the State government – under the Karnataka Urban Water Sector Improvement Project (KUWASIP) – a pilot 24/7 water supply project was initiated on a PPP model through a performance-based management contract with Veolia-Eau Compagnie Générale des Eaux (CGE), a French

[5] Not available in the public domain

water engineering company. The total cost of the project was estimated at INR 237 crore (INR 182 crore was the World Bank loan and INR 55 crore was contributed by GoK).

The total contract amount was INR 28 crore; 60 percent of it being fixed remuneration and 40 percent based on performance. There is also a maximum penalty of 10 percent if the operator fails to deliver as per the Service Level Agreement (SLA). The project was rolled out in three phases (Annexure II), partially and fully covering 10 of the 58 wards in Belgaum North and South. It came into operation in 2008. The project has also been demonstrated in zones in the twin cities of Hubli-Dharwad and Gulbarga.

As of today the councils at Belgaum City Corporation and Hubli Dharwad Municipal Corporation (HDMC) have passed resolutions to extend the project to the entire urban local body. Government Orders (GO Number/ Date: UDD 81/PRJ/2008, dated 6 October 2008) have also been passed to scale up the scheme to the entire city of Belgaum at a cost of INR 220 crore. Tata Consulting Engineers Limited (an engineering consulting firm) have been chosen through a competitive bidding process to study the existing system and prepare a contract/ bidding document to upscale the 24/7 water supply system to the entire city. Meanwhile, the existing private water engineering company Veolia Water has been given an extension of contract to continue with the operation and maintenance of the existing demo zones.

The details of the key stakeholders of the private operator managed water supply are provided in Annexure III.

1.3 Structure of the report

The report is divided into six chapters. The present chapter is introductory and provides a brief background and a review of the literature on 24/7 water supply; a brief idea of the area under study and the two systems of management, public and private, currently under study. Chapter 2 outlines the research questions and the objectives of the study. Chapter 3 provides the details of the method and approach as well as the assumptions adopted for this study. Chapter 4 presents the findings and the discussion. Chapter 5 is about the beneficiary needs assessment exercise and its findings. The final chapter (Chapter 6) presents the conclusion and maps the way ahead.

2. OBJECTIVES

The study involved undertaking a socio-economic impact evaluation of the said projects, and was specifically aimed at:

- Carrying out a cost-effectiveness analysis of the drinking water supply systems under different systems of management, i.e. public (corporation managed) and private (private operator managed) supply systems.
- Devising a method for comparing water supply utilities with similar objectives but under different systems of management – both public and private.
- Determining the critical success factors for effective implementation of the drinking water supply systems through public management.

2.1 Research questions

Based on set objectives, certain research questions were formulated taking into account the nature of the projects:

- Which would be a more cost effective method for the drinking water supply in the city of Belgaum?
- What are the critical success factors for implementing an efficient water distribution utility?

Other than these two main research questions there were other auxiliary questions that were also looked at through the course of the study:

- Has the quality of water significantly improved in the demonstration zones?
- Has consumer satisfaction significantly increased in the demonstration zones?

3 RESEARCH METHOD

3.1 Data sources and collection

The study relied on both primary data collected through household surveys and stakeholder interviews, and secondary data obtained through water utility operators. Inputs were sourced from both corporation managed and private operator managed water supply project areas.

Table 0.1: Data type, sources and purpose of data collection

Data type	Purpose of collecting data	Data source
Primary	To collect information on the effectiveness of the CMWS and PMWS and cost details at the beneficiary's end as well as inputs for beneficiary profiling: • Basic demographic details • Current water supply situation • Current sources of water • Incidence of diseases • Customer satisfaction	Household level questionnaire [refer to Annexure IV]
	To learn about the management practices under the two systems of water supply (CMWS and PMWS).	Stakeholder interviews
	To gather project cost data and other operational information [refer to Annexure V for data requested from CMWS and	For CMWS: • Belgaum City Corporation • KUWSDB For PMWS: • CGE office

Secondary	PMWS projects] [refer to Annexure VI for the interview guide used to collect data from the water supply operators]	• Operator office in Belgaum • Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) • KUWSDB
		Project data: • Interviews with officials

Apart from this, wherever necessary, data sources from the internet have been used to aid the analysis.

Table 3.2 shows the parameters on which effectiveness and cost were considered while designing the questionnaire.

Table 0.2: Parameters on which effectiveness and cost were considered

Effectiveness	• Quality of water supply - frequency, water quality, saving of time • Reducing wastage of water at consumer end • Improving customer service and satisfaction • Incidence of diseases
Cost	• Amount paid to avail such a service • Sources of water being used and the expenditure on these sources

Once the questionnaire was designed, a pilot survey was run (covering CMWS and PMWS beneficiaries) for ten households covering different socio-economic profiles.

The interview guide was used as a tool to direct questions and to elicit responses from the stakeholders of both PMWS and CMWS systems. These questions covered critical managerial and operational issues that play an important role in delivering the services to the consumers. Identified stakeholders were interviewed about specific questions spanning the period of identified phases of the project (refer to Figure 3.1).

Figure 0.1: Identified phases of the project

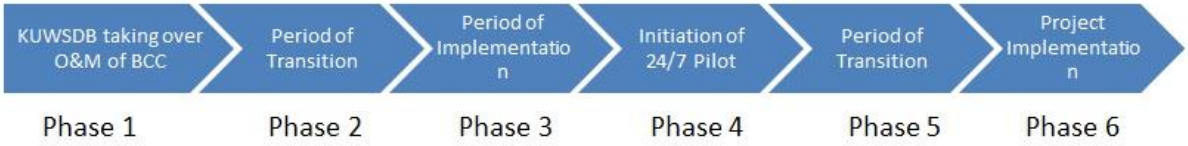


Table 0.3: Interviewed stakeholders

Stakeholder	Phases Covered for Interview
KUWSDB (Executive Engineer, Belgaum City)	All Phases
KUIDFC (Assistant Executive Engineer, Project Implementation Unit or PIU)	Phases 4,5,6
Belgaum City Corporation (Commissioner, Chief Accounts Officer)	All Phases
Fitchner Consultants (Field Officer)	Phases 4,5,6
CGE (Project Manager, North and South Demo Zone)	Phases 4,5,6

3.2 Sample design

The total population of Belgaum is 610,189 as per the 2011 census. The number of household connections at the time of the survey was 46,004 across both non-demonstration and demonstration zones. The former was supplied by the corporation managed water supply while the latter was supplied by the private operator managed water supply. The demonstration zone also had a similar cross-section of customers as the non-demonstration zone (pp. 4-5; WSP, 2010). Sample selection (especially for the non-demonstration zone) was limited by budget constraints.

As households in the study area were supplied water from either the corporation managed or private operator managed water supply (two distinct populations), a two-stage cluster sampling technique was used. Efforts were made, within these clusters, to have representation from all socio-economic groups. The sample households were selected randomly from the list provided by the corporation and the private operator for their respective areas of water supply; 560 and 591 households were to be surveyed from the corporation managed and private operator managed water supply areas respectively. This sample size includes a confidence interval or margin of error of 4 and a confidence level of 95 percent. As both the clusters constitute the entire Belgaum population and are representative of this population, the possibility of a sampling error is reduced.

All efforts were made to collect data from the estimate sample. However due to the availability of data on members of individual households, the final sample surveyed was 552 and 545 households from the corporation managed and private operator managed water supply areas respectively. Table 3.4 shows how the sample size was selected, and the final sample size arrived at post-survey.

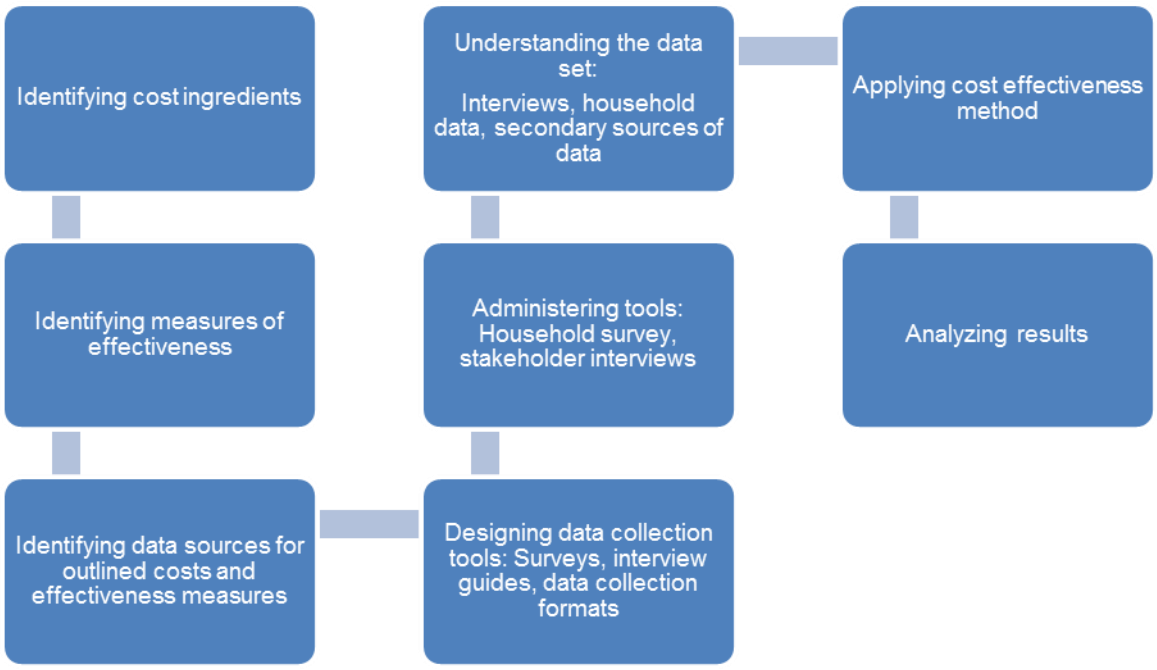
Table 0.4: Sample selection for CMWS and PMWS

Metric	CMWS	PMWS
Population (number of HSCs at the time of survey)	8,313	37,691
Confidence Level	95%	95%
Confidence Interval	4	4
Estimated Sample Size	560	591
Sample size post-survey	552	545

3.3 Framework of analysis to measure the cost effectiveness of CMWS and PMWS

This study uses a model which attempts to capture the relevant cost and effectiveness measures of the two systems of water supply. Figure 3.2 shows the overall process flow of the analysis.

Figure 0.2: Process flow of analysis



3.4 Measuring cost-effectiveness ratios

Cost-effectiveness analysis (CEA) is a type of economic analysis that compares the relative costs and outcomes (effects) of two or more courses of action. CEA is distinct from cost benefit analysis which assigns a monetary value to the measure of effectiveness. Typically the CEA is expressed in terms of a ratio where the denominator is a gain and the numerator is the cost associated with the gain (Levin & McEwan 2000).

$$\text{Cost-effectiveness ratio or CER} = \frac{Cost\ (monetary)}{Effectiveness\ (non-monetary)}$$

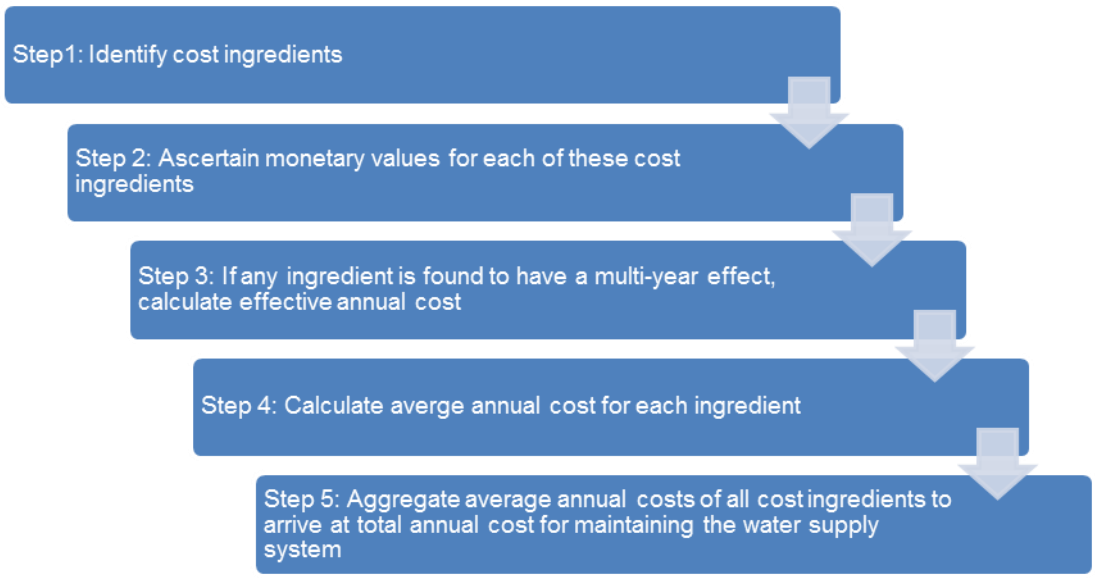
Measuring costs: The cost equation

The two water supply utilities are quite varied: Corporation managed water supply has been in operation for many years, while private operator managed water supply went into operation only in 2007 (prior to data collection for this study). Water supply utilities are capital-intensive; maximum expenditure was incurred by the private operator managed water supply during the initial phase of its operation towards priority investments such as overhead storage tanks, source augmentation, refurbishment of the existing distribution networks, new valves, pressure meters and other such capital-intensive inputs.

Corporation managed water supply too used some of the existing facilities but also incurred some additional capital expenditure. However, owing to the non-availability of data and for the sake of comparison (given the varied population sizes that the two projects covered) only the running (or operation and maintenance) costs of these two water supply utilities were considered for analysis. Hence, an annual average running cost per thousand households for each utility and for each cost ingredient was computed.

Method: To arrive at an average annual cost for running the water supply utilities, a step-wise process needs to be carefully followed to arrive at the right cost. Figure 3.3 illustrates the same.

Figure 0.3: Method for computing Average Annual Cost



Once the aggregate cost was computed, an annual average cost per thousand connections was computed using the following formula:

$$Total\ average\ annual\ cost\ of\ maintaining\ water\ supply\ distribution\ per\ 1000\ connections = \frac{\text{Annual average cost of maintaining water supply}}{Number\ of\ Connections\ (in\ 1000s)}$$

Measuring effectiveness: the Effectiveness Index

Effectiveness assumes various dimensions, especially when it comes to water supply utility analysis. Overall effectiveness encompasses effectiveness measures at the supplier's end and at the end-consumer level. While we can arrive at an aggregate measure of effectiveness, it would be better if these measures were dealt with and compared separately. Hence a multi-dimensional model was used to measure effectiveness. The two different approaches that could be adopted, based on the availability of data, are:

Approach I: Aggregate Effectiveness Index

An aggregate effectiveness index is defined as:

$$Effectiveness\ Index\ or\ EI = Weighted\ sum\ (Water\ supply\ quality\ index + Customer\ satisfaction\ index - Morbidity\ index - Inequity\ index)$$

Table 0.5: List of Effectiveness Indices

Index	Explanation of index	Measure
Water Supply Quality Index (WSQI)	-	$= (Water\ quality\ index + Supply\ quality\ index + Customer\ service\ index)$
Morbidity Index (MI)	Gives the number of people ill with water-borne disease as a proportion of the project area.	$= \frac{Number\ of\ persons\ with\ water\ borne\ diseases}{Population\ of\ area}$
Customer Satisfaction Index (CSI)	Gives an overall score of how satisfied the end users are on various aspects of their water supply system such as frequency of supply, quality of water, timing of supply, affordability of service, quantity of water supplied, pressure of supply and customer service. A Likert scale is used to calculate the satisfaction scores.	$= \frac{Total\ customer\ satisfaction\ score\ received}{Maximum\ total\ customer\ satisfaction\ score} * 100$
Inequity Index	An inequity index represented in terms of a Gini-coefficient would give a measure of how equitable the two water supply utilities are in terms of charging the end	$= \frac{Concentration\ index\ of\ out\ of\ pocket\ expenditure\ on\ water}{Concentration\ index\ of\ monthly\ expenditure}$

	users. Ideally poorer households should pay less while richer households should pay more.	
Water Quality Index[6]	Both the water supply utilities have a systematic way of measuring water quality. Samples from both the source and consumer end are tested as per a set schedule. Water samples are tested for both biological presence and for chemical balance. Since the same bulk water is supplied to both the project areas, what would be more interesting to see is the water quality at the household level. However, this measure will not be used in the model as there is no comparable data since the water supply utilities use different measures for water quality.	Data collected from water quality tests
Supply Quality Index	Gives a measure of the adequacy of supply and also factors in the disruptions in supply.	Average number of disruptions in a year per household
Customer Service Index	Is the summation of average response time index and the average resolution time index. This index provides a measure of how efficiently consumer end grievances are dealt with.	$= \frac{Total\ number\ of\ complaints\ resolved\ in\ a\ given\ time}{Total\ number\ of\ complaints\ logged\ in\ a\ year}$
Outage Frequency Index	This gives a measure of the average number of disruptions in water supply for a household in a year.	-

[6] Since water quality measures are not comparable, this index will not be used in the model. However, it is important to make a note of this index.

NOTE: The above indices were constructed from variables or other indices and each index was computed as follows:

$Index\ or\ X = \frac{x - \min(x)}{max\ (x) - \min(x)}$	Where, x = current value Min(x) is the lowest value variable *x* can take, and Max(x) is the highest value variable *x* can take

Approach II: Factor Analysis

Using the same indicators, we compute an effectiveness score for every respondent. An effectiveness score is a function of household morbidity rate, customer satisfaction score, customer service score and customer financial viability score.

Step 1: For each respondent of CMWS and PMWS, compute:

- Household morbidity rate, i.e. number of persons sick out of the total household size.
- Customer satisfaction score.
- Household water supply outage frequency, i.e. outage frequency score.
- Per capita water storage score.

Step 2: Conduct factor analysis:

- Identify principal components.
- Arrive at a single component using Eigen values of each principal component.

Step 3: Compute mean effectiveness score for both CMWS and PMWS:

- $Mean\ effectiveness\ score\ for\ PMWS = \frac{Total\ effectiveness\ score\ of\ all\ respondents\ in\ PMWS}{Total\ number\ of\ valid\ respondents}$
- $Mean\ effectiveness\ score\ for\ CMWS = \frac{Total\ effectiveness\ score\ of\ all\ respondents\ in\ CMWS}{Total\ Number\ of\ valid\ respondents}$
- The mean effectiveness score now can be used for computing the CER.

Constraints/ assumptions

- **Data related:**
  - The data provided by government officials is correct and valid.
  - The responses provided by those interviewed/ surveyed reflect the uninfluenced and real answers.
  - Any secondary data used for the study is correct and valid.

- **Method related:**
  - The sample size chosen for the non-demonstration zone was limited by budget constraints.
  - Only annual average running costs (operations and maintenance) were considered for analysis. For the corporation managed water supply, the average of three years was taken (as the data for three years was made available), while for private operator managed water supply only one year data was used.

- Owing to the non-availability of cost data for power charges for private operator managed water supply these were computed using the data for power charges for corporation managed water supply.

- **Other constraints:**
  - Larger issues relating to Rights and other political economic factors have not been addressed.

3.5 Framework for analysis: Management strategy

One of the critical inputs to an efficient water supply distribution system is effective utility management. Public utilities like water boards, being no different from any other service-oriented organization need to maintain certain prescribed service levels to fulfill their obligations. Hence, looking into the management aspect of public utilities gives us valuable insight into the efficiency of the utilities. Also, a study of the managerial practices helps bring out best practices – if any – that can be replicated in other project contexts.

Method

A management strategy is a right mix of important managerial aspects. Some of these, which are being studied, are depicted in Figure 3.4. Each category was further divided into indicator ingredients – some quantitative and some qualitative. Thereafter, the two utilities were compared across these indicators of management strategy.

Figure 0.4: Managerial aspects for comparison

Table 0.6: Management aspects of water utilities

Management Strategy	Indicators (Qualitative/ Quantitative)	Measure
Organizational Aspects	Turnover Rate	Per 100 employees per annum
	Personnel Development	Number of training programs conducted: At which levels and how often?
	Employee Satisfaction	Does the organization conduct an employee satisfaction survey?
	Labor Productivity	Number of staff per 1,000 connections
	Labor Ratio	Ratio of skilled and unskilled workers
Financial Aspects	Operating Ratio	Ratio of operating expenses as a percentage of revenue
	Return on Assets	Net income divided by total number of assets
	Operating Revenue versus Budget	Projected operating revenue/ plan budget
	Debt Ratio	Total liabilities/ total assets
Functional Aspects	Mission Statement	Does the organization have a mission statement?
	Control Aspects	What are the kinds of control used? What are the control mechanisms?
	Decision Making	How are decisions taken? How democratic is the process?
	Job Charts/ Roles	Are there Job Charts for every post?
	Reporting	What is the reporting structure?
	Decentralization	Role of local governments
	Problem Escalation	What is the mechanism for problem escalation?
Community Engagement	Water Adalat[7]	Are public water forums held? What is the frequency and output of such forums?
	Community Outreach	Number of educational presentations in a year
	Community Opinion	What is the level of engagement of the community when it comes to decisions like revising water tariffs?
	Overall Customer Satisfaction	Number of customers who rate the water supply as good/ excellent (through the household survey).
NOTE: Some of the indicators have been adapted from 'AWWA Manuals of Water Supply Practices, Standards, and Benchmarks'.		

[7] Public forum for addressing customer grievance.

4 FINDINGS AND DISCUSSION

This section highlights the findings from the analysis. Detailed tables for these are attached in Annexure VII.

4.1 Descriptive analysis of sample data

Information was collected and analysis was done for 552 households receiving corporation managed water supply and 545 households receiving private operator managed water supply.

The tables, not given here, are attached in Annexure VII.

4.2 Profile of CMWS and PMWS households

- Table 8.1 (Annexure VII) presents a descriptive analysis of the sample data. It shows the demographic characteristics – such as property tax, monthly household expenditure, and household size – of the data from both CMWS and PMWS areas. As can be seen, the mean for all the demographic characteristics for PMWS is lower by a small fraction compared to CMWS, except in the case of property tax.
- The frequency distribution of households as per their location (slum or non-slum[8]) across the two project areas is similar (Table 8.2, Annexure VII). The percentage of CMWS households located in the non-slum areas is 85, as against 83 percent of PMWS households, while 15 percent of CMWS and 17 percent of PMWS households are located in declared slum areas.
- The frequency distribution of the sample households, as per type of house (Table 8.3, Annexure VII) is more or less the same for both project areas, with 87 percent houses being of the pucca[9] type and 13 percent being kuccha[10] houses.
- The frequency distribution of households by caste shows that among the beneficiaries, the maximum number (about 40 percent) belong to the scheduled castes/ scheduled tribes community, with a larger percentage being in the non-demonstration zone (CMWS area). The distribution across other castes is more or less similar for both project areas (Figure 8.4, Annexure VII).
- Frequency distribution of households by monthly household expenditure (Figure 8.5, Annexure VII) across both project areas shows a similar distribution curve; any asymmetry present is only in the case of monthly household expenditures exceeding INR 10,000.

Thus, clearly, there is consistency in the socio-economic indicators across both CMWS and PMWS areas.

[8] A slum, as defined by the United Nations agency UN-HABITAT in their 21st Session of the Governing Council (2007), is "a heavily populated urban area characterised by substandard housing and squalor"; they are usually located in a run-down area of a city, and lack tenure security.

[9] A Pucca house is a house with a concrete roof. Pucca houses are considered to be of a more permanent nature and are indicators of better living conditions as opposed to Kuccha houses.

[10] A Kuccha house is a house without concrete roof.

4.3 Sources of water supply across CMWS and PMWS areas

Here, we examine the cross-tabulation of data across the sources of water supply for households in the project areas.

i. In both the project areas the main source of water supply for houses located in slum and non-slum areas (Table 8.4, Annexure VII) is the municipal water supply, followed by own wells and bore-wells. None of the households use water from a shared community source. Hence, all the households have access to an improved water supply source. The households in the PMWS zone own fewer wells and bore-wells as compared to the CMWS areas.

ii. When access to sources of water is differentiated by monthly consumption expenditure of households (Table 8.5 and Figure 8.4, Annexure VII), it is seen that the majority of households (in both CMWS and PMWS areas) that have access to municipal (piped) water supply fall in the expenditure category of INR 2,000 to INR 6,000, suggesting that a high proportion of lower income households have access to piped water supply.

iii. When the incidence of water-borne diseases across the project areas is mapped against the source of water (Table 4.1), we see that there is greater prevalence of such diseases in the case of PMWS as compared to CMWS – a surprising result considering that an important feature of a 24/7 water supply system includes supplying water with a minimum residual pressure of 6m[11] which would result in reduced incidence of contamination and disease. However, besides the quality of water supply; there are many other local factors (such as cleanliness of the areas around water sources, frequency of hand-washing by individuals etc.) that contribute to the incidence of water-borne diseases; hence measuring the benefit of the improved water supply to health is not simple. In addition there is no baseline data for water-borne diseases, against which the current results can be compared. Long-term studies may indicate a specific quantitative relationship between the water supply and health, but in the absence thereof, this higher prevalence of water-borne diseases in the PMWS area is inconclusive.

Table 0.1: Incidence of diseases across project areas by source of water

Source of water	CMWS				PMWS			
	Diarrhea	Jaundice	Gastro	Others	Diarrhea	Jaundice	Gastro	Others
Municipal	13	8	26	1	24	9	47	1
Own well	2	1	2	0	1	1	5	0
Bore-well	0	0	0	0	0	0	0	0
Community Source	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0

iv. Water availability is less of an issue in PMWS compared to CMWS (Table 4.2), but surprisingly, the reverse seems to be true when it comes to the issue of water quality. Though this supports the earlier result of disease incidence being higher in 24/7 supply

[11] Refer to project documents.

(PMWS), one needs to keep in mind that in CMWS areas, people are more used to lower quality service and are, therefore, less likely to register a difference in water quality, unless it is a very obvious difference. In the PMWS areas, on the other hand, once people get used to consistent levels of water quality, even the slightest change would be immediately noticed. However, it is still a matter of concern that the respondents from PMWS areas report changing water quality across seasons.

Table 0.2: Water availability across zones

	CMWS		PMWS	
	Yes	**No**	**Yes**	**No**
Is water available during all seasons?	207	345	535	10
Does water quality change from time to time in a year?	194	358	279	266

4.4 Cost-effectiveness analysis

A serious challenge to conducting the cost-effectiveness analysis was the non-availability of data. For this purpose, certain assumptions (listed in sub-section 4.4) were made.

4.4 Computation of cost data

While computing the cost, we needed to consider both capital costs and operations and maintenance costs. However, as data on capital costs were not provided; we have only considered the O&M costs of both the water supply utilities for the purpose of comparison.

There are many components to O&M costs. One such component is the cost of power/ electricity supply needed to supply water. This constitutes a significant chunk of the cost of supplying water, especially in the case of the 24/7 water supply as it requires the maintenance of continuous pressure in the distribution system at all times. However, as actual figures for power costs incurred by the private operator managed water supply system were not made available, these were calculated using the three-year data received from the corporation managed water supply system. An average of these figures has been used to calculate the power costs for the PMWS.

To do this, we first calculated the number of hours of service provided for each supply utility (Table 4.3); then using the power costs for all the corporation managed water supply connections, we estimated the power cost per thousand connections for the private operator managed water supply (Tables 4.4 and 4.5).

Table 0.3: Calculation of number of hours of service provided

	Corporation managed water supply (water is supplied for 2 hours every 3 days)	**Private operator managed water supply (24/7 water supply)**
Number of days service is provided during the year	122	365
Hours of service per day	2	24
Total number of hours of service provided per year	243.33	8,760.00

Table 0.4: Power costs for CMWS

	CMWS			
Power costs (part of O&M costs)	2006-07	2007-08	2008-09	Average for 3 years
Power costs for all connections*	133,090,639.00	134,487,636.00	119,063,610.80	128,880,628.60
Number of connections*	42,199	44,967	37,886	41,684
Power costs for 1,000 connections**	3,153,881.35	2,990,807.39	3,142,680.96	3,095,789.90
Number of hours of service provided to 1,000 connections***	243,333.33	243,333.33	243,333.33	243,333.33
Power costs for 1 hour of supply to 1,000 connections[#]	12.96	12.29	12.92	12.72
NOTE: All cost figures are in INR				
*As per government data collected during the CBPS CEA study, 2012				
**Power costs for 1,000 connections = (Power costs for all connections/ Number of connections)*1000				
***Uses the total number of hours of service provided per year (given in Table 4.3) *1000				
[#]Calculated by dividing the power costs for 1,000 connections by the number of hours of service provided to 1,000 connections				

Table 0.5: Power costs per thousand connections

	CMWS	PMWS
Power cost per 1,000 connections	3,095,789.90	111,448.44
*Calculated using the average figure for providing 1 hour of CMWS supply to 1,000 connections and multiplying this with the total number of hours of service provided by PMWS.		

Then to calculate the total operations and maintenance costs, the O&M cost incurred for power as well as for other components (other than power) was added. Once again an average of the three-year data for the CMWS system was used (Table 4.6), while for the PMWS, the data for the period May 2008 to April 2009 (which was made available) was used to calculate the O&M costs other than power (Table 4.7). For the total operations and maintenance cost for PMWS the figure calculated for power per 1,000 connections was added to the rest of the O&M costs to arrive at a total figure.

Table 0.6: O&M costs for CMWS

	CMWS			
	2006-07	**2007-08**	**2008-09**	**Average for 3 years**
O&M (including power costs)*	146,787,384.00	165,446,946.00	185,299,835.00	165,844,721.67
O&M (excluding power costs)**	13,696,745.00	30,959,310.00	66,236,224.20	36,964,093.07
Number of connections *	42,199	44,967	37,886	41,684
O&M (excluding power) for 1,000 connections	324,575.11	688,489.56	1,748,303.44	920,456.04
*As per government data collected during CBPS CEA study, 2012 **To calculate this, the figures for power costs for CMWS provided in Table 4.4 have been deducted from the figures for O&M (including power costs)				

Table 0.7: O&M costs of CMWS and PMWS

	CMWS	PMWS
Number of connections	41,684	8,118
O&M (including power costs)	165,844,721.67	-

O&M (excluding power costs)	36,964,093.07	1,467,066.00
O&M (excluding power) for 1,000 connections	920,456.04	180,717.66
Power charges (per 1,000 connections)	3,095,789.90	111,448.44
Total O&M cost for 1,000 connections	4,016,245.94	292,166.10

The operations and maintenance costs for the CMWS are higher than the O&M costs for PMWS.

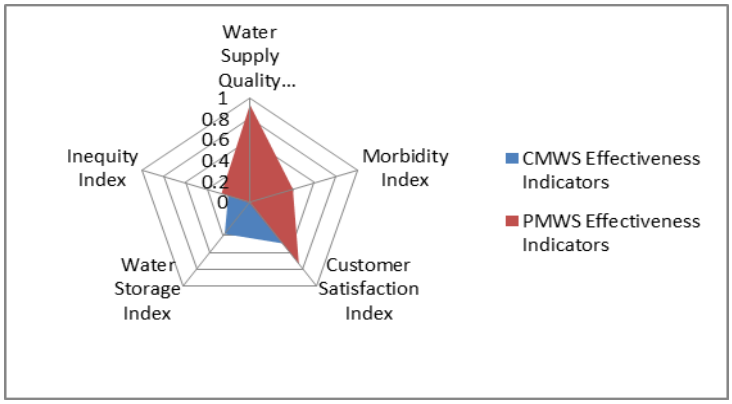
4.5 Computation of effectiveness data

Given the availability of data, Approach I was used to compute the effectiveness, using the Aggregate Effectiveness Index. However, Approach II (Factor Analysis) has also been used to further aid the analysis (Table 8.6, Annexure VII).

The ranking (scoring) was done based on inputs and feedback from a focus group discussion. The highest rank was accorded to water supply quality index followed by morbidity index, inequity index, customer satisfaction index and water storage index.

The weights were arrived at after ranking the measures according to importance. A weighted sum was then calculated to arrive at the weighted index for each measure. A radar chart representation of this data (Figure 4.1) shows the spread across the indicator parameters.

Figure 0.1: Radar chart of Effectiveness Indices



4.6 Computation of cost-effectiveness ratio

Using Approach II (Factor Analysis), the scores for the various parameters listed were computed. After identifying the principal components and arriving at a single measure of effectiveness using *Eigen values* of the principal components, the mean effectiveness score was computed.

Table 0.8: Cost-Effectiveness Ratios

	Cost* (in INR)	Effectiveness	C/E Ratio
CMWS	920,456.04	29.31	31,404.16
PMWS	180,717.66	31.36	5,762.68
NOTE: Effectiveness scores have been taken on a scale of 100. **Cost does not include power costs.*			

As seen in Table 4.8 private operator managed water supply is more cost effective (C/E ratio of PMWS is lower than that of CMWS). However, a deeper analysis of the components of effectiveness indices (Table 4.9) reveals that the effectiveness scores are not statistically significant.

Table 0.9: Effectiveness scores analysis (Independent Samples t-Test)

Parameter/ Measure	Desirable Value	CMWS	PMWS	Test for Significant Difference (Independent Samples T test)
Customer satisfaction score	Higher value is desirable	0.56	0.77	Not Significant (Sig: 0.435)
Mean household morbidity rate	Lower value is desirable	0.03	0.40	Significant Sig: 0.00
Per capita water storage (liters per day)	Lower value is desirable	163.65	5.032	Significant Sig: 0.00
Mean outage frequency score	Lower value is desirable	0.66	0.87	Not Significant (Sig: 0.316)
Combined factors (mean effectiveness score: Factor Analysis)	Higher value is desirable	-1.0481E -08	2.7721E -07	Not Significant (Sig: 0.435)

As seen in Table 4.9, only the mean household morbidity rate and water storage score are significantly different. This is not the case with the rest of the parameters. Although the PMWS fares better than the CMWS on three of the four factors, the difference is not statistically significant.

4.7 Comparing the management models

In this section a comparative analysis of the two utilities is presented, using the performance and management indicators.

4.8 Organizational aspects

Table 8.7 (Annexure VII) shows that the labor productivity ratio for private operator managed water supply (4.3) is slightly lower than the labor productivity of the corporation managed water supply (4.5). Labor productivity is one measure of operational efficiency and a higher ratio may indicate inefficient use of staff (World Bank 2002); therefore, the labor productivity of private operator managed water supply seems better than that of corporation managed water supply. However, the staff accounted for in this calculation does not include the managerial staff of the private operator managed water supply.

The higher ratios may indicate that single water connections serve multiple households, which is indeed the case. They may also indicate that the utilities have more employees than needed; a World Bank water scorecard (2002) suggests that utilities should aim for 5 or less staff per 1,000 connections. It is interesting to note that the ratios for both the utilities are much lower than the national average of major cities in India which stands at 7.4 (ADB, MoUD, 2007); they are low even compared to the ratio for Bangalore city, which is 5.2.

As far as training is concerned, staff recruitment in the case of the corporation managed water supply takes place for different categories of people; for the more technical and managerial staff, scheduled training programs are conducted when needed, while for non-technical staff, on-the-job training is the norm.

One interesting aspect of private operator managed water supply is the implementation of performance-based incentives (based on performance targets) where a portion of the revenue of the operator is dependent on how efficiently the utility is managed. These performance targets include specifications for physical losses, the turnaround time for new water connections, turnaround time to address consumer complaints, specifications for the water supply pressure to be maintained, repair of leakages within a specified timeframe, etc.

4.9 Financial aspects

The private operator managed water supply has a lower operating ratio as compared to corporation managed water supply (Table 4.10). This shows that the PMWS has greater ability to generate profit even if its revenues decrease, which is a measure of its operational efficiency. In fact, the operating ratio for PMWS is much lower than the national average for major cities in India (which stands at 1.63).

Data for other financial indicators were not available (Table 8.8, Annexure VII); these include return on assets, operating revenue versus budget and debt ratio.

Table 0.10: Indicators of financial aspects - Operating ratio

Indicators (Qualitative/ Quantitative)	Measure	CMWS	PMWS	Benchmark
Operating ratio	Ratio of operating expenses as a percentage of Revenue	2.88	0.9	National average for major cities in India 1.63

4.10 Functional aspects

The setting of water tariffs is one of the primary roles of an urban local body. Tariffs are usually approved by the local council after being set by the operator and/ or a higher governing body (i.e. the state government). However, it is the private operator that usually requests for revision of tariffs due to increased production costs. It is interesting to note that water tariffs were revised and brought down in the private operator managed water supply project following political pressure (Raghavendra 2010). However, on a daily basis, the local government and the elected body have a minor role to play apart from making policy decisions, which again – more often than not – is a result of a hierarchical approach (Table 8.9, Annexure VII).

4.11 Community engagement

Table 8.10 (Annexure VII) shows that the private operator managed water supply is more consumer-oriented as it has a special wing dedicated to interfacing with consumers. This could perhaps be attributed to the nature of the project (being the first project with the element of private sector participation). The result of this consumer-centric approach can be seen in the consumer survey where PMWS enjoys a favorable position in the minds of the consumers (around 89.5 percent of the respondents in the survey gave this utility an overall satisfaction rating of good/ excellent).

This is in stark contrast to the corporation managed water supply, where only 26.2 percent of the respondents rated the utility as being good/ excellent.

4.12 Other performance indicators[12]

Prior to the private operator managed water supply demonstration in Belgaum City Corporation, very few households were metered. It was only recently that the water utility in Belgaum started to take proactive measures to meter the connections. We tried to measure connection efficiency (proportion of total connections that are not disconnected from the supply) as a surrogate of service coverage efficacy (Mugisha 2007). In the corporation managed water supply, the connection efficiency stands at 37 percent

[12] Adapted from ADB, MoUD, 2007.

which is quite low as compared to private operator managed water supply with 100 percent metered connections (Table 4.11).

As far as the per capita consumption of water is concerned, it is claimed that with the 24/7 water supply, the consumption tends to reach an optimal quantity as the storage of water decreases. This study supports this claim as the per capita storage in private operator managed water supply is significantly lower compared to the corporation managed water supply.

Table 0.11: Other performance indicators

Indicators (Qualitative/ Quantitative)	Measure	CMWS	PMWS
Water availability	Number of hours per day	Once in 3 days for 2 hours	24 hours a day, 7 days a week
Consumption per capita	Liters per capita per day	110	90-135
Connections metered	Total number of metered connections as a percentage of total number of connections	37.1	100
Revenue collection efficiency	(Total annual collections/ total annual billings) *100	NA	>90%[13]

5 BENEFICIARY NEEDS ASSESSMENT

Post the cost-effectiveness analysis of drinking water utilities in the Belgaum City Corporation, wherein the corporation managed and private operator (Veolia water) managed water supply utilities were compared, certain issues were identified. The importance of understanding the factors contributing to the felt need of a 24/7 water supply utility became clear. So, a beneficiary needs assessment exercise was conducted to gain an insight into how consumers meet their daily water requirements.

5.1 Research method and approach

The qualitative technique of focus group discussions (FGDs) was used to gather information from the end beneficiaries of both corporation managed and private operator (Veolia water) managed water supply utilities (refer to Annexure VIII for the discussion guide).

[13] Source: Belgaum City Corporation Website http://www.belgaumcity.gov.in/ws

This study was carried out in five residential areas (Table 5.1) in Belgaum district during a brief field visit in January 2012. The areas where the study was conducted were randomly chosen; three of these were selected from the demonstration zone (private operator managed water supply), and two were selected from the non-demonstration zone (corporation managed water supply).

Of the 96 beneficiaries who participated in the discussions; 66 percent were female and the remaining 34 percent were male. The age-wise percentage distribution of the beneficiaries is shown in Figure 5.1.

Figure 0.1: Age-wise distribution of respondents in the beneficiary needs assessment exercise

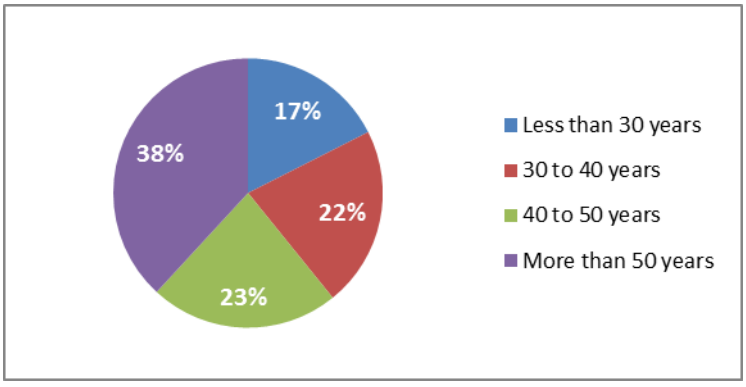


Table 0.1: Areas where beneficiary needs assessment exercise was conducted

Water supply utility	Name of residential area	Brief description of the area
Private operated managed	• Wadder wadi	The slum residents are predominantly SC/ ST and are employed mostly as daily wagers or semi-skilled or unskilled workers/ laborers. The women work as household help or do other such unskilled work in other neighborhoods or at construction sites in the city.
	• Nehru Nagar	The neighborhood is primarily lower-income with a large number of Marathi (not Kannada - the main language of the state) speaking residents. Residents are employed in the government or have their own small businesses/ petty shops. The women are primarily homemakers.
	• Azam Nagar	Azam Nagar is predominantly populated by the Muslim community and households range from lower to middle income.
	• Basava Kuduchi and	Kuduchi belongs to Ward No. 58, the last ward of BCC. Basava Kuduchi is a village in transition to becoming an urban village, with many families still

Corporation managed	• Devaraj Urs colony, Kuduchi	involved in agriculture. The discussant group comprised of male senior citizens. Devaraj Urs colony, on the other hand, is a lower to middle income neighborhood with individual occupations ranging from small business owners to retired government employees.
	• Shahapura	Shahapura is a lower to middle income neighborhood with many Marathi speaking residents, who are employed in the government or have their own small businesses/ petty shops.

5.2 Summary of findings

Purposes for which water is used

Beneficiaries use the water supply for various purposes: drinking, cooking, washing utensils, cleaning the house, washing clothes, sanitation/ hygiene (bathing, brushing, flushing, washing hands), and for other purposes. In Basava Kuduchi, water is also used for washing cattle.

Water Sources

CMWS	PMWS
All people depend on the corporation water supply for drinking and cooking purposes. However, they utilize other sources of water such as bore-wells, own dug wells and even water tankers when the corporation supply becomes highly erratic and unreliable. The Devaraj Urs colony also had a lake, which has since dried up and does not yield much water anymore.	The 24/7 water is used for drinking and cooking purposes by all people. However, its other uses vary from area to area. In Wadder wadi, beneficiaries collect rainwater during the rainy season and use this for purposes other than cooking, while in Nehru Nagar, they also use bore-well water for other purposes. Wadder wadi also has public standpipes; these have not been used much as household taps were provided along with the 24/7 supply.

Water accessibility

CMWS	PMWS
Many seem to have resigned themselves to the current erratic water supply. Public bore-wells are not maintained very well and many have been overused so they yield very little water. Even when corporation water is supplied, people are not too concerned about wastage as their bills are fixed in any case.	Water supply is continuous and regular and supplied by way of taps to every house.

Frequency of supply & customer care

CMWS	PMWS
Corporation water supply is unreliable; at times the situation is so dire, especially for those who do not have the wherewithal to purchase tankers of water that they drink bore-well water and then fall sick. In certain areas people have attached motors to the incoming water pipes to pull the water when it is supplied. So, those with the wherewithal get more water, while others who cannot afford motors, suffer. Only the residents of Shahapura, who participated in the discussion, mentioned that any planned outages/ water supply issues are published in the local newspaper 'Tarun Bharat'.	Water supply is regular, with constant pressure, and residents do not have to worry about collecting water. In addition, the private operator office usually sends at least one person to inform about any outages that may take place due to repairs/ maintenance. This enables the beneficiaries to plan in advance and store water for the duration of the outage. People were also asked about the placement of the taps fitted (at the front of house) so that the same could be convenient to them.

Quantity utilized

Consumption of water varies from family to family as well as with season.

Water storage

CMWS	PMWS
Given the unreliable supply of corporation water, people have got used to storing large quantities of water. It is the lower-income households who are suffering more as they do not have the space to store large enough quantities of water.	To ensure careful use, people still store water in pots, barrels.

Time spent collecting water

CMWS	PMWS
Most people spend a lot of time collecting water from bore-wells, lakes, etc. However, in the middle-income neighborhoods, people just call for water tankers when they do not get the corporation water supply.	With 24/7 supply, people can get water by just turning the tap. No more than half to one hour each day is spent on collecting water.

Meters and tariffs

See Annexure IX for water tariff table.

CMWS	PMWS
Household connections are not metered; where meters do exist, they are non-functional. People pay INR 1,000 per year, in two half-yearly installments. In addition, many who can afford it, end up ordering water tankers at INR 250 to INR 500 per tanker of water.	All connections are metered from the time the 24/7 water supply became operational. People are aware of the volumetric tariff that has been set; however, they feel that due to the change in the tariff slabs their bills have increased. They also seem unsure about how long the INR 30 extra per month[14] (which is currently being billed) will continue. People are concerned about the increased bills, particularly where taps support 10-15 individuals (they have larger family sizes and have also let out different floors of their house to other families, all of whom depend on the same tap). To regulate their 24/7 water use, people also use sources of water other than the 24/7 supply. In the lower to middle-income neighborhoods, people have even put a lock on the tap to ensure that others do not use the water indiscriminately. What is interesting to note is that the slum residents pay each bill on time and also carefully preserve their paid bills, while this is not the case in the lower to middle income neighborhoods.

Making water potable

CMWS	PMWS
Very few people boil water before drinking. Hence, when they use sources of water other than the corporation supply – especially bore-well water – they tend to fall sick.	People do not boil water (except during two months post pregnancy/ delivery in the case of women). Some filter the water using a cloth. It is only during the rainy season (when water is red and muddy) that the water quality is seen as a problem.

[14] This amount is being charged to recover the meter cost of INR 2,000.

Do people think 24/7 water supply is needed?

CMWS	PMWS
People would be happy with regular and continuous water supply, even if it is not 24/7; however, as non-24/7 water supply is not regular, they feel 24/7 will be helpful. They are willing to pay for the metered bills.	People do not mind having even 6/7 water supply (six hours a day, seven days a week), just so long as it is assured. However, they are not willing to compromise on the reliability of the water supply.

5.3. Findings from beneficiary needs assessment

Those currently being supplied the 24/7 water seem largely satisfied with the supply, while those in the non-demonstration zone getting the corporation water supply are looking forward to reliable, assured 24/7 service being expanded to the entire City Corporation of Belgaum. However, people in both these zones are quite concerned about the high tariffs.

The tariffs currently being implemented are increasing volumetric block tariffs where the charge per unit of consumption is a function of the consumption bracket and is the same for all units within the bracket. As suggested by Raghavendra (2006), cited in Folifac and Gaskin (2011), though such tariff may be economically efficient[15], it may not be equitable based on the size of the blocks, especially the first block which consists of poor households with low per capita water consumption and large family size. Such households will end up paying tariffs in higher brackets and, therefore, pay a higher volumetric charge than small, rich households with higher per capita consumption.

Also, though the existing consumers are paying for the use of the 24/7 water supply, and others have expressed their desire to avail of the benefits of such a service and have also expressed their willingness to pay for the service, this does not mean that all consumers have the ability to pay the high tariffs; in fact their willingness is just indicative of their need for an assured service and the value they place on clean, reliable water supply (Folifac & Gaskin 2011).

6 CONCLUSION

This study has thrown up many more questions than answers. With the increasing funds flowing in from International Financial Institutions into the water supply infrastructure sector, the pressure on local governments to deliver is also mounting. In the wake of the private sector participation in public service delivery, the stand-off between government agencies and citizen groups continues. While governments are taking the position of improving the efficiency of public utilities, citizen groups support the argument that the government is giving up its responsibility in meeting the basic needs of the citizens.

[15] On one hand an increasing volumetric block tariff sends stronger water conservation signals by charging users higher tariffs for higher consumption blocks; on the other hand it makes basic water use (consumption within the first block) more affordable by way of low tariffs.

This study of cost-effectiveness analysis and comparing the management models of the water utilities was undertaken in order to examine the issues related to the efficiency of these utilities. The research method stressed on looking at both quantitative as well as qualitative aspects of the issues under study. The results show that though the private operator managed water supply system (PMWS) has a lower cost-effectiveness ratio, the effectiveness indicators are not significantly different from those of the corporation (public) managed water supply system (CMWS). However, while comparing the management models, it was seen that private operator managed water supply system has better performance indicators and management practices as compared to the corporation (public) managed water supply system.

This study alone cannot serve as an aid to making the correct choice between the two projects. The issues being dealt with are far more complex in nature, and solicit a more detailed analysis of the political economy of service delivery systems. For this an in-depth financial analysis of the projects, especially with regard to financial sustainability and economic feasibility needs to be undertaken; the current study captures this aspect only in a limited manner.

Issues in the water sector are not stand-alone issues; they are interconnected issues of privatization, tariffs, efficiency, etc.; bringing about any change requires a more nuanced and in-depth understanding of these issues. Hence, it becomes important to look at the need for such a 24/7 project: is it that people want a 24/7 water supply, or are they just looking for a reliable, assured system of water supply – even if it is only for a few pre-set hours each day? This becomes relevant especially in view of the fact that despite the various benefits of a 24/7 water supply, its advantages could only be had along with other prerequisites that may or may not always be available (Sangameswaran et al. 2008). For example, 24/7 electricity supply is a prerequisite for a 24/7 water supply project (which requires continuous pumping of water); however, given the electricity deficit of the state, would a 24/7 water supply be a good supply model to adopt in major towns and cities (Babu 2003; Sangameswaran et al. 2008)? This is a question which requires further thought and research. It is also felt that the 24/7 water supply project is also doing well because so far it has received assured bulk water supply, but how far can this be continued, given the conflicting claims over the sources of water?

The issue of asymmetry of information also fuels the debate of private sector participation over public management and vice-versa. It has been seen during the course of this study that both public and private agencies managing the public utilities do not usually share adequate and accurate project-related information with each other and with citizen groups. If this communication gap is bridged it can go a long way in overcoming anxieties and building trust with the community.

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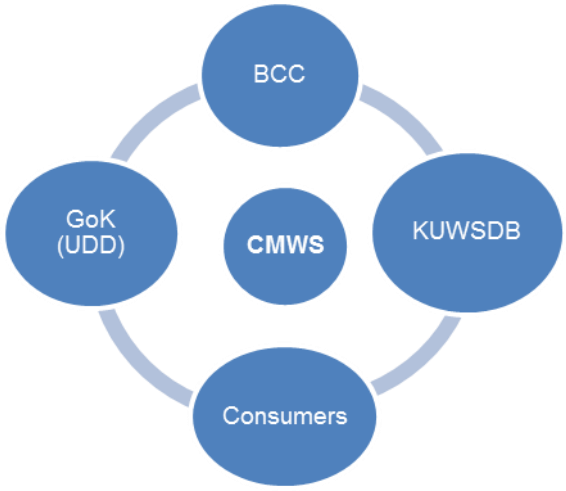
8 ANNEXES

8.1 Annexure I: Key Stakeholders of CMWS

Figure 0.1: Key stakeholders of CMWS



The key stakeholders of CMWS (Figure 8.1) are:

Urban local body: Belgaum City Corporation

It is the responsibility of the local government to provide adequate quantities of safe drinking water to its citizenry. The BCC, which has the power to set and revise water tariffs, has been carrying out this function ever since its inception.

Monthly meetings are held between the Corporation, the Commissioner and the Executive Engineer of KUWSDB to discuss operational issues. The water tariffs collected by KUWSDB are deposited into an escrow[16] account of the BCC each month. The corporation owns all the assets created for the supply and distribution of water within its administrative boundaries.

Operator: Karnataka Urban Water Supply and Drainage Board

The chief responsibility of KUWSDB is the operation and maintenance of the drinking water supply system in the BCC, which involves:

- Source water augmentation
- Source water quality monitoring and treatment
- Supply of bulk water to 24/7 water demo zones
- Approving new connections
- Billing and collection of water tariff

[16] Escrow: An arrangement whereby an independent trusted third-party receives and disburses money and/ or documents for two or more transacting parties; the timing of such disbursement by the third-party is dependent on the performance by the parties as per the agreed-upon contractual provisions.

- Attending to consumer complaints
- Operation and maintenance of the water distribution system.

Government of Karnataka: Urban Development Department

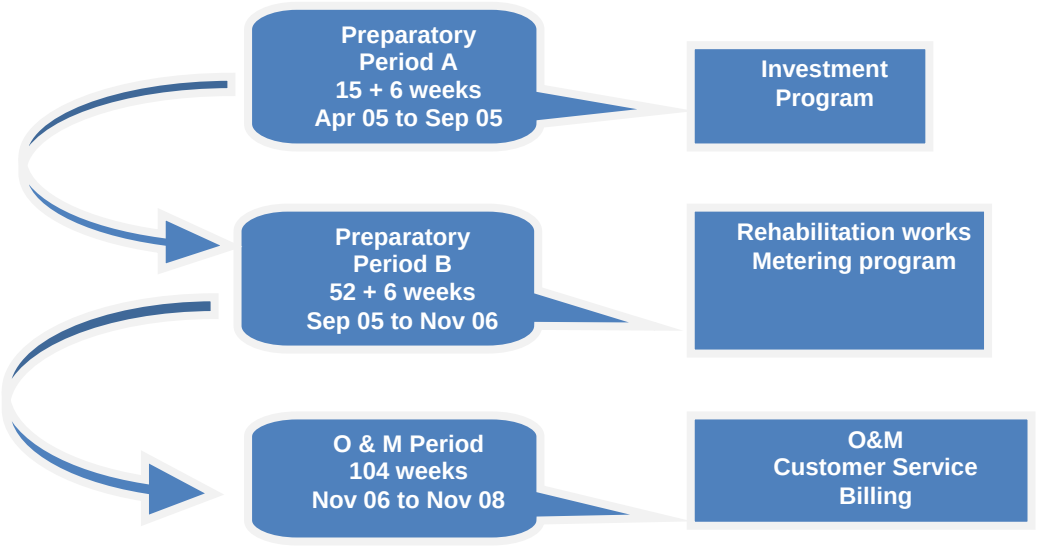
Both, the Commissioner of the BCC and the KUWSDB report to the Urban Development Department (UDD). UDD plays the key role of approving works that are beyond the approval powers of the local government (i.e. greater than 5 crore).

Consumers: Citizenry of Belgaum City Corporation

Being the end users, the citizens and other civil society organizations play an important role; that of putting in place a public service delivery system that is accountable to everyone.

3.1 Annexure II: Phases of 24/7 demonstration

Figure 0.2: Phases of 24/7 demonstration



Preparatory Period 'A'

This phase is for developing, designing and providing the client with a comprehensive rehabilitation plan including costing and a quality assurance program, called the "Final Investment Program".

Preparatory Period 'B'

This phase is for carrying out the "Final Investment Program" agreed upon during the Preparatory Period 'A'.

O&M Period

Is for maintaining the guaranteed performances as stipulated in the Contract, thus giving confidence to the client that 24/7 is feasible and sustainable.

Source: Project document as provided by CGE.

3.2 Annexure III: Key Stakeholders of PMWS

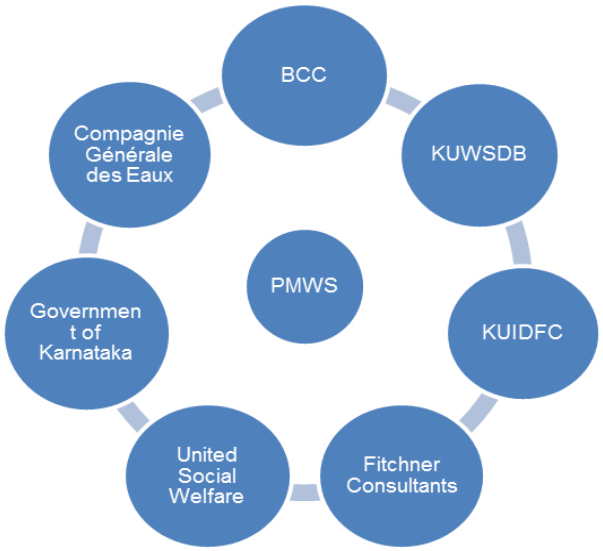
The key stakeholders of PMWS (Figure 8.3) are:

Urban local body: Belgaum City Corporation
The role of the local government primarily lies in setting priorities, ensuring equity, making policies and setting tariffs, among others. The BCC makes all policy related decisions in consultation with the state government.

Bulk water provider and priority investment works: KUWSDB
The KUWSDB undertook priority investment works that mainly included the building of overhead storages, and the augmentation of source. The KUWSDB supplies bulk water to the PMWS demo zones. It played a key role in helping the private operator set up the demonstration zones. It also deployed its personnel (20 in number) during the initial stages of the project. The KUWSDB is still responsible for the billing and collection of water tariffs in the demo zones.

Project management and funding: KUIDFC
The KUIDFC – a nodal agency, an SPV that channelizes institutional loans from the World Bank; in this case to fund infrastructure and development projects – coordinates all the activities relating to the 24/7 demonstration project. A project implementation unit has been set up in Belgaum, headed by an Assistant Executive Engineer.

Figure 0.1: Key stakeholders of PMWS



Operator (demonstration zone works): CGE
Compagnie Générale des Eaux (CGE) and Seureca are the private operators chosen to undertake the demonstration of the 24/7 water supply management. They are responsible for the operation and maintenance of the existing network. All customer grievances are handled by CGE staff.

Technical Auditors: Fichtner Consultants

Fitchner Consultants are the technical auditors for the project. They audit the technical aspects of the project, looking into issues of water quality and the quality of the distribution system.

Communication and advocacy (Social intermediary and communications strategy): United Social Welfare

United Social Welfare, a Belgaum based NGO was involved initially in building the trust of people and creating awareness as there were widespread apprehensions about the nature of the project since it was being executed under a management contract.

As of now a social communications strategist handles the engagement with the community, providing inputs on how to communicate project-related information to the public.

Water supply core-committee

A core-committee comprising of a representative of the key stakeholders, including

- Commissioner, BCC (Chairperson)
- Official from KUWSDB
- Official from CGE
- Official from KUIDFC's PIU
- Social intermediary and communications strategist meets every week at the BCC to share issues and general updates; audit reports are presented and discussed in this forum.

3.2 Annexure IV: Household Survey Questionnaire

Section I **ID number**

Name				
Age				
Sex				
Caste				
Occupation				
Address				
Ward number	No. :	Slum☐	Non-Slu☐	
Type of Household	Pucc☐	Kutc☐	Owne☐	Rente☐
Amount of Property Tax paid in the current year (in INR)				
Household composition	No. of Families:	No. of Adult Males:	No. of Adult Females:	No. of Children:
Total monthly household expenditure (in INR)				

Section II Existing Connection

(please tick wherever applicable)

1.	Is your connection metered?	Yes	No
2.	If yes, since when has your connection been metered? (MM/YY)		
3.	How much did you pay for the meter?	INR	
4.	How many connections are there on your premises?		
5.	Are separate water bills being levied?	Yes	No
6.	Are water bills being levied regularly?	Yes	No
7.	If Yes, what is the amount paid during the last three months?	INR	
8.	If No, what is the reason?		

Section III Sources of Water, Consumption Pattern, Charges

9. Please fill in the table (this is regarding the current sources of water).

No.	Source of Water	Usage*	Quantity of Usage(in liters/day)	Frequency of Usage/Supply **	Charges (in INR/Month)
i	Municipal Water				
ii	Own Well				
iii	Borewell				
iv	Community Source				
v	Others				
*	Drinking – 1 | Washing – 2| Sanitation – 3 |				
**	Daily – 1 | Once in two days – 2 | Once in three days – 3 | Once in a week – 4 | 24/7 – 5				

10.	Do you store water?	Yes	No
11.	If Yes, how much of water is stored (in liters) on an average?		
12.	What is the duration (in days) for which water is stored?		

Section IV Availability of Water

13.	Is water available during all seasons in sufficient quantities?	Yes	No
14.	Does the water quality change over the year?	Yes	No

Section V Incidence of Diseases

15. Please fill in the details below, if any family member has fallen ill in the past 1 year

No.	Particulars	No. of Persons		
		Male	Female	Children
i	Diarrhea			
ii	Jaundice			
iii	Gastro-Enteritis			
iv	Others			

Section VI Customer Service

16. How often does the household have water interruptions in the piped water supply? (Tick any one)
    a. Daily
    b. Weekly
    c. Monthly
    d. Yearly
    e. Never

17. What normally causes the interruption? (Tick any)
    a. Burst pipes
    b. General maintenance
    c. Not enough water at source
    d. Water delivered only at fixed times
    e. Non-payment for services
    f. Power failure
    g. There is no interruption
    h.

18. Have you ever registered a complaint since the time you have taken this connection? If Yes,

No.	Type of Complaint	When did you get a response?	When was the issue resolved?	Were you satisfied with the service?
1				
2				
3				

19. If No, Why haven't you registered a complaint?

Section VII Customer Satisfaction

20. Please rank your current water supply along the following parameters (1 to 6):

Parameter	Rank
Continuous Water Supply	
Better Quality of Water	
Improved health conditions	
Lesser spending on water	
Lesser time to fetch water	
Customer Service	

21. On a scale of 1 (low) to 5 (high) please mark the level of your satisfaction with your current water supply on the following parameters:

Parameter	Scale				
	Excellent	**Good**	**Neutral**	**Fair**	**Poor**
Overall Satisfaction					
Frequency of Supply					
Quality of Water					
Affordability of Service					
Quantity of Water					
Pressure of Supply					
Customer Service					

22. Which of the following aspects of your water supply needs improvement? (Please rank on a scale of 1 to 6)

Parameter	Rank
Frequency of Supply	
Quality of Water	
Affordability of Service	
Quantity of Water	
Pressure of Supply	
Customer Service	

23.	If water supply is not 24/7, would you want 24/7 water supply in your locality?	Yes	No
24.	Would you be willing to go for a metered connection for your household?	Yes	No
25.	If Yes, Would you be willing to pay more for improved service quality?	Yes	No
26.	If No, Why?		
27.	What in your opinion is the most critical problem faced by residents of your locality today?		

3.2 Annexure V: Cost and project related data collection formats

For CMWS

Project Related Information:

	Unit	**2006-07**	**2007-08**	**2008-09**	**2009-10**
General Information					
Number of water connections	Number				
Number of households covered	Number				

Number of households metered		Number				
Number of wards covered		Number				
Population covered		Number				
Target coverage per beneficiary		LPCD				
Water Production						
Total raw water at point of bulk supply		MLD				
Total treated water distributed		MLD				
Total metered water supplied/ billed		MLD				
Metered coverage per beneficiary		LPCD				
Distribution Network						
Total length of newly laid water distribution pipe system		meters				
Total length of refurbished water distribution pipe system		meters				
Storage volume in distribution system		m^3				
Personnel Information						
Number of staff on corporation's pay roll		Number				
Number of staff on KUWSDB's Pay roll		Number				
Total number of staff		Number				
Quality of Water						
Arsenic	*Permissible limit*					
	Present amount					
Fluoride	*Permissible limit*					
	Present amount					
Iron	*Permissible limit*					
	Present amount					
Incidence of water borne disease	*Before intervention(number of cases reported)*					
	After intervention(number of cases reported)					
Quality of Supply/ Service						

Number of citizen service centers	Number				
Number of recorded disruptions	Number				
Number of complaints lodged	Number				
Number of complaints resolved within the prescribed time	Number				

Project Costs Related Information:

	Unit	**2006-07**	**2007-08**	**2008-09**	**2009-10**
Investments					
Source Development	INR				
Water Treatment	INR				
Ground Storage	INR				
Elevated Storage	INR				
Pump Station	INR				
Distribution System	INR				
Sanitation & Drainage	INR				
Consulting Services	INR				
Investigations	INR				
Institutional Support	INR				
Physical Contingencies(if applied)	INR				
Total Investments	INR				
Operation & Maintenance					
Labor*	INR				
Electricity	INR				
Chemicals	INR				
Other O&M**	INR				
Total O&M	INR				
Raw Water Cost (if any)					
Project Water Produced	m^3				
Raw Water Tax/m^3	INR/m^3				
Project Raw Water Tax	INR				
Total Project Costs					
*Break-up of Labor Costs					
(Belgaum Excluding Demo Zone)	2006-07	2007-08	2008-09	2009-2010	
Assistant Engineer					
Work Inspector					
Valve Men					
Fitters					
Clerk					
Bill Collector					
**Details of Other O&M					

Item	2006-07	2007-08	2008-09	2009-2010	
Tariff Structure	2006-07	2007-08	2008-09	2009-2010	
Domestic					
Non-Domestic					
Commercial					
Lifetime Costs	Meters(Bulk & Pressure)				
	Pipes				
	Valves				
	Storage Tanks				
	Water Treatment Plants				

For PMWS
Project Related Information:

		Unit	2007-08	2008-09	2009-10
General Information					
Number of water connections		Number			
Number of households covered		Number			
Number of households metered		Number			
Number of wards covered		Number			
Population covered		Number			
Target coverage per beneficiary		LPCD			
Water Production					
Total raw water at point of bulk supply		MLD			
Total treated water distributed		MLD			
Total metered water supplied/ billed		MLD			
Metered coverage per beneficiary		LPCD			
Distribution Network					
Total length of newly laid water distribution pipe system		meters			
Total length of refurbished water distribution pipe system		meters			
Storage volume in distribution system		m^3			
Personnel Information					
Number of staff on corporation's pay roll		Number			
Number of staff on contractor's pay roll		Number			
Total number of staff		Number			
Quality of Water					
Arsenic	*Permissible limit*				
	Present				

	amount				
Fluoride	*Permissible limit*				
	Present amount				
Iron	*Permissible limit*				
	Present amount				
Incidence of water borne disease	*Before intervention(number of cases reported)*				
	After intervention(number of cases reported)				
Quality of Supply/ Service					
Number of citizen service centers		Number			
Number of recorded disruptions		Number			
Number of complaints lodged		Number			
Number of complaints resolved within the prescribed time		Number			

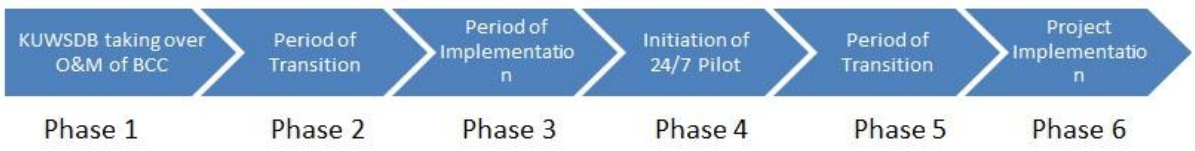
Project Cost Related Information:

	Unit	**2007-08**	**2008-09**	**2009-10**
Investments				
Source Development	INR			
Water Treatment	INR			
Ground Storage	INR			
Elevated Storage	INR			
Pump Station	INR			
Distribution System	INR			
Sanitation & Drainage	INR			
Consulting Services	INR			
Investigations	INR			
Institutional Support	INR			
Physical Contingencies(if applied)	INR			
Total Investments	INR			
Operation & Maintenance				
Labor*	INR			
Electricity	INR			
Chemicals	INR			
Other O&M**	INR			
Total O&M	INR			
Raw Water Cost (if any)				

Project Water Produced	m^3			
Raw Water Tax/m^3	INR/m^3			
Project Raw Water Tax	INR			
Total Project Costs				
*Break-up of Labor Costs				
(Belgaum N&S DZ)	**2007-08**	**2008-09**	**2009-2010**	
Assistant Engineer				
Work Inspector				
Valve Men				
Fitters				
Clerk				
Bill Collector				
**Details of Other O&M				
Item	**2007-08**	**2008-09**	**2009-2010**	
Tariff Structure	**2007-08**	**2008-09**	**2009-2010**	
Domestic				
Non-Domestic				
Commercial				
Lifetime Costs	Meters(Bulk & Pressure)			
	Pipes			
	Valves			
	Storage Tanks			
	Water Treatment Plants			

3.2 Annexure VI: Interview guide for data collection from water supply operators

Identified phases based on which interview will be conducted:



For KUWSDB Official

Phase 1

1) Why was O&M handed over to KUWSDB?

2) Since when have you been handling O&M?
3) Was there a formal agreement between Belgaum City Corporation and KUWSDB? What are the Terms of Agreement? (Request for copy of agreement)
4) What are the charges being levied on the ULB? Has there been revision of charges? (Request data on this for the relevant period)

Phase 2
5) What was the procedure followed for taking over? Is there a standard operating procedure which KUWSDB follows while taking over O&M in a given ULB?
6) What hurdles/issues did you face while taking over O&M? (organizational/labor/capacity/funds)
7) What measures were taken to overcome these issues?
8) Was any training given to the staff? What kind of training and at what frequency?
9) What were your priorities?
10) Was the current system studied? What were the identified areas for improvement? What measures were taken to improve these?

Phase 3
10) What was the mandate on customer service? What was done in this regard? Did KUWSDB run any surveys to find out what the customers felt?
11) Details of BCC staff being deployed TO KUWSDB for implementation of the 24/7 project.
12) Organizational changes undertaken.
13) How was performance measured? Were any performance indicators designed?
14) What kind of data is being maintained? What were the reasons to maintain and collect this data?
15) Request for Data on Capital & O&M Expenditure incurred up to the current year.

Phase 4
16) What was KUWSDB's role in the 24/7 pilot project? What were you consulted for?
17) Was there any resistance to this project? If yes, why, and how were these issues resolved?
(Find out any revenue loss for KUWSDB after verifying revenue statements before/after 24/7 pilot)

Phase 5
18) How were the demo zones chosen? What were the considerations before choosing the demo zones? What was KUWSDB's role in this?
19) Was there any handing over of assets/systems to the contractors once the 24/7 pilot was rolled out?
20) On what basis were administration/working boundaries drawn? What issues did you face?

Phase 6
21) Is there any coordination between the KUWSDB and the contractor? What were the issues faced in this regard? If unresolved, who is the problem escalated to?
22) What is the role of the ULB?

23) When is the BCC likely to take back the responsibility?

Other questions related to the project
24) What is the depreciation rate used for assets, for accounting purposes?
25) Request for a copy of the Schedule of Fixed Assets along with the depreciation rates being used.
26) Are lifetime costs calculated? Lifetime costs for assets (list).
27) Are there bulk meters? Request for the monthly bulk meter readings for the past 4 years.
28) Do you work towards a target per capita water production/supply? What is your current target? Request for data over the years indicating LPCD supply.
28) What are you doing to improve the service quality? Have there been any innovations to improve the service quality?
29) Do you consult the beneficiaries? How often (frequency)?
30) Do you maintain data on water quality? What is the frequency at which water samples are tested? What is the procedure followed?
31) Who do you report to? Accounts/Water Quality. What is the role of the local government?
32) Are there audits? What kind of audits? How often? Who audits? What happens to the audit report? What action is taken on the audit report?

For KUIDFC Official
Phase 1
1) What was KUWSDB's role in the 24/7 pilot project? What were you consulted for?
2) Was there any resistance to this project? If yes, why, and how were these issues resolved?
3) How were the demo zones chosen? What were the considerations before choosing the demo zones? What was KUWSDB's role in this?
4) What was the role of the ULB?

Phase 2
5) What is the role of the NGO? Request for contact.
6) Was there any handing over of assets/systems to the contractors once the 24/7 pilot was rolled out?

Phase 3
7) Is there any coordination between KUWSDB and the contractor? What were the issues faced during coordination? If unresolved, who is the problem escalated to?
8) What is the role of the ULB?

Phase 4
9) What is the current status?
10) What is the extent of involvement? Staff/ Distribution of roles.

Other questions related to the project
11) What is the deprecation rate used for assets, for accounting purpose?

12) Request for a copy of the Schedule of Fixed Assets along with the depreciation rates being used.
13) Are lifetime costs calculated? Lifetime costs for assets (list).
14) Are there bulk meters? Request for the monthly bulk meter readings for the past 4 years.
15) Do you work towards a target per capita water production/supply? What is your current target? Request for data over the years indicating LPCD supply.
16) What are you doing to improve service quality? Have there been any innovations to improve service quality?
17) Do you consult the beneficiaries? How often (frequency)?
18) Do you maintain data on water quality? What is the frequency at which water samples are tested? What is the procedure followed?
19) Who do you report to? Accounts/Water Quality. What is the role of the local government?
20) Are there audits? What kind of audits? How often? Who audits? What happens to the audit report? What action is taken on the audit report?
21) When there are no bulk meters, how can you conclusively say that the consumption has gone down from earlier levels? (15 MGD output?)
22) Has there been an observed decrease in consumption? (From the time they stopped giving new connections – in which case it would be possible to determine the decrease).

For Corporation Commissioner
1) Why was O&M handed over to KUWSDB?
2) Is there any plan to take back the responsibility?
3) Was there a formal agreement between Belgaum City Corporation and KUWSDB? What are the Terms of Agreement? (Request for copy of agreement)
4) What are the charges being levied on the ULB? Has there been revision of charges? (Request data on this for the relevant period)
5) Is there a monitoring system in place? Do the water supply utilities report to you? What is the accountability structure? What is done if there is a deviation?
6) What kind of data is reported? Do you submit this to someone? Is it tabled for discussion in the council?
6) How is the revenue sharing happening?
7) What assets were handed over to KUWSDB?
8) What assets were handed over to the contractor?
9) Any staff under your payroll working for KUWSDB?
10) Who does KUWDSB liaise with in BCC? What is the frequency of the coordination?
11) Who does the contractor report to? What frequency?
12) Are water sabhas held?
13) How different has your experience been with KUWSDB as compared to private operator?
14) Which in your opinion is better for the customers? Why?

For Chief Accounts Officer, Belgaum City Corporation
Phase 1 & 2
1) Why was O&M handed over to KUWSDB?
2) Is there any plan to take back the responsibility?

3) Was there a formal agreement between Belgaum City Corporation and KUWSDB? What are the Terms of Agreement? (Request for copy of agreement)
4) What are the charges being levied on the ULB? Has there been revision of charges? (Request data on this for the period)
5) Is there a monitoring system in place? Do they report to you? What is the accountability structure? What is done if there is a deviation? What kind of data is reported? Do you submit this to someone? Is it tabled for discussion in the assembly?
6) How is the revenue sharing happening?
7) What assets were handed over to KUWSDB?
8) What assets were handed over to the contractor?
9) Any staff under your payroll working for KUWSDB?
10) Who does KUWDSB liaise with in BCC?
11) Who does the contractor report to? What frequency?
12) Role of KUIDFC?
13) Are there water sabhas?

Phase 3
10) What was the mandate on customer service? What was done in this regard? Did KUWSDB run any surveys to find out what the customers felt?
11) Details of staff deployed for project implementation
12) Organizational changes undertaken.
13) How was performance measured? Were any performance indicators designed?
14) What kind of data is being maintained? What were the reasons to maintain and collect this data?
15) Request for Data on Capital & O&M Expenditure incurred up to the current year

Phase 4
15) What was KUWSDB's role in the 24/7 pilot project? What were you consulted for?
16) Was there any resistance to this project? If yes, why, and how were these issues resolved?
(Find out any revenue loss for KUWSDB after verifying revenue statements before/after 24/7 pilot)

Phase 5
17) How were the demo zones chosen? What were the considerations before choosing the demo zones? What was KUWSDB's role in this?
18) Was there any handing over of assets/systems to the contractors once the 24/7 pilot was rolled out?
19) On what basis were administration/working boundaries drawn? What issues did you face?

Phase 6
20) Is there any coordination between KUWSDB and the contractor? What were the issues faced during coordination? If unresolved, who is the problem escalated to?
21) What is the role of the ULB?
22) When is BCC likely to take back the responsibility?

Other Questions related to the Project

23) What is the deprecation rate used for assets, for accounting purposes?
24) Request for a copy of the Schedule of Fixed Assets along with the depreciation rates being used.
25) Are lifetime costs calculated? Lifetime costs for assets (list).
26) Are there bulk meters? Request for monthly bulk meter readings for the past 4 years.
27) Do you work towards a target per capita water production/supply? What is your current target? Request for data over the years indicating LPCD supply.
28) What are you doing to improve the service quality? Have there been any innovations to improve the service quality?
29) Do you consult the beneficiaries? How often (frequency)?
30) Do you maintain data on water quality? At what frequencies are water samples tested? What is the procedure followed?
31) Who do you report to? Accounts/Water Quality. What is the role of the local government?
32) Are there audits? What kind of audits? How often? Who audits? What happens to the audit report? What action is taken on the audit report?

3.2 Annexure VII: Detailed tables

Table 0.1: Descriptive analysis of sample data

	CMWS					PMWS				
	N	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation
Property Tax	552.00	1.00	16000.00	600.58	844.12	545.00	1.00	8000.00	627.92	815.57
Monthly Household Expenditure	552.00	0.00	30000.00	4850.54	2732.91	545.00	0.00	25000.00	4846.24	2429.59
Total Number of Family Members	552.00	1.00	57.00	6.99	4.09	545.00	2.00	38.00	6.68	3.67

Table 0.2: Frequency distribution of HHs across project areas by location of house

Location of House	CMWS		PMWS	
	Frequency	Percent	Frequency	Percent
Slum	81	14.7	95	17.4
Non-Slum	471	85.3	450	82.6
Total	552	100.0	545	100.0

Table 0.3: Frequency distribution of HHs across projects by type of house

Type of House	CMWS		PMWS	
	Frequency	Percent	Frequency	Percent
Pucca	477	86.4	478	87.7
Kuccha	75	13.6	67	12.3
Total	552	100.0	545	100.0

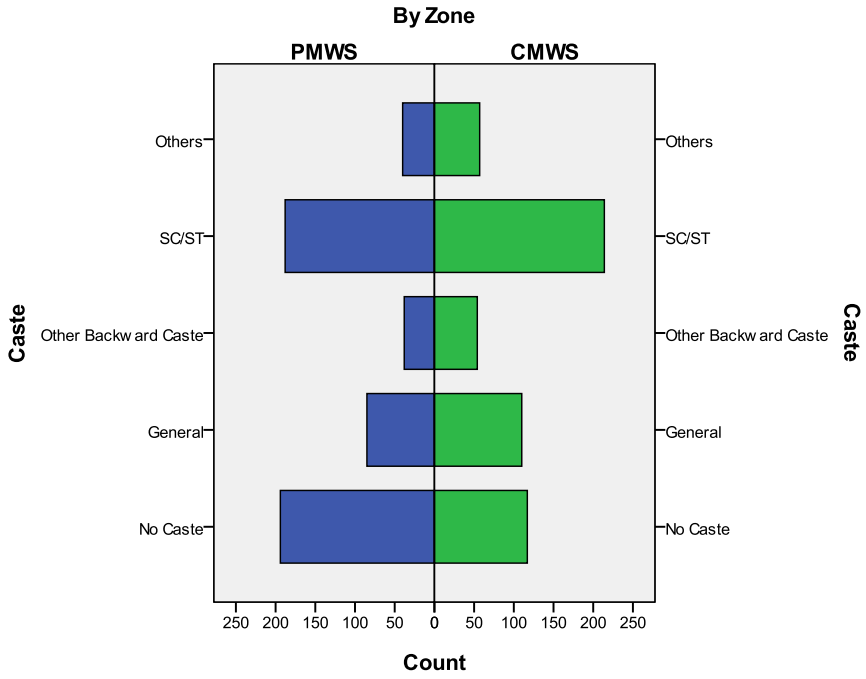


Figure 0.2: Frequency distribution of HHs by caste

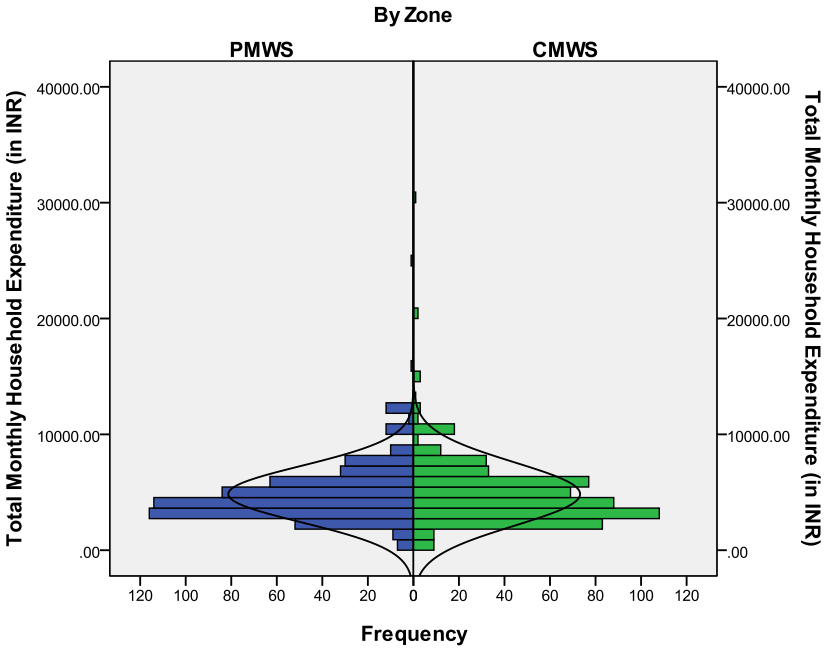


Figure 0.3: Frequency distribution of HHs by monthly HH expenditure

Table 0.4: Sources of water supply by location of house

	CMWS					PMWS				
	Municipal Water	Own Well	Bore-well	Community Source	Others	Municipal Water	Own Well	Bore-well	Community Source	Others
Slum	78	17	7	0	2	95	29	1	0	0
Non-Slum	458	86	25	0	3	450	27	3	0	0
Total	536	103	32	0	5	545	56	4	0	0

Table 0.5: Sources of water supply by monthly consumption expenditure

Monthly Consumption Expenditure (in INR)	CMWS					PMWS				
	Municipal Water	Own Well	Bore-well	Community Source	Others	Municipal Water	Own Well	Bore-well	Community Source	Others
No Response	9	1	0	0	0	7	1	0	0	0
<= 2,000	38	5	2	0	0	31	0	2	0	0
2,001 to 3,000	110	15	3	1	1	93	8	0	0	0
3,001 to 4,000	102	24	8	2	1	143	11	0	0	0
4,001 to 5,000	96	25	6	1	0	108	12	0	0	0
5,001 to 6,000	75	10	3	0	0	63	13	1	0	0
6,001 to 7,000	33	5	2	1	1	30	2	0	0	0
7,001 to 8,000	32	7	2	0	0	32	4	1	0	0
8,001 to 9,000	12	2	1	0	0	10	1	0	0	0
9,001 to 10,000	19	6	3	0	0	12	2	0	0	0
10,001 +	10	3	2	0	0	16	2	0	0	0
Total	536	103	32	5	3	545	56	4	0	0

Table 0.6: Summary of effectiveness data for water supply utilities

Step 1: Measure	CMWS (Score)	PMWS (Score)	CMWS (Index)	PMWS (Index)
Customer Satisfaction	0.56	0.77	0.47	0.74
Household Morbidity Rate	0.03	0.40	0.03	0.40
Water Storage Index	163.65	5.03	0.09	0.08
Outage Frequency Index	0.66	0.87	0.66	0.87
Inequity Index	0.20	0.27	0.21	0.27
Customer Service Index	0.99	1.00	0.99	1.00
Step 2: Measure	**CMWS (Index)**	**PMWS (Index)**	**CMWS (Weighted**	**PMWS (Weighted**

			Index)	Index)
Water Supply Quality Index	0.82	0.94	0.33	0.37
Morbidity Index	0.03	0.40	0.01	0.08
Customer Satisfaction Index	0.47	0.74	0.05	0.07
Water Storage Index	0.38	0.08	0.01	0.00
Inequity Index	0.20	0.27	0.04	0.05
Aggregate Effectiveness Index	0.70	0.99	0.29	0.31

Table 0.7: Indicators of organizational aspects

Indicators (Qualitative/ Quantitative)	Measure	CMWS	PMWS	Benchmark
Personnel Development	Number of training programs conducted; at which levels and at what frequencies	KUWSDB has on-the-job-training for its employees, but there is no specific training plan.	CGE, the private operator have their own internal training	-
Employee Satisfaction	Does the organization conduct an employee satisfaction survey?	Data not available	Data not available	-
Labor Productivity	Number of staff per 1,000 connections (3 year average)	4.5	4.3	National average of major cities in India = 7.4
Labor Ratio	Ratio of skilled and unskilled workers	Data not available	Data not available	-
Performance Based Incentives	-	No performance based incentives	Yes, there are defined SLAs between the operator and the local government	-

Table 0.8: Indicators of financial aspects

Indicators (Qualitative/ Quantitative)	Measure	Remarks
Return on assets	Net income divided by total number of assets	Data not available for both project areas
Operating revenue versus budget	Projected operating revenue/ plan budget	Data not available for both project areas
Debt ratio	Total liabilities/ total assets	Data not available for both project areas

Table 0.9: Indicators of functional aspects

Indicators (Qualitative/ Quantitative)	Measure	PMWS	CMWS
Control Aspects	What are the kind of controls used? What are the control mechanisms?	Organizational control through formal hierarchy	Organizational control through formal hierarchy. Also, processes in place depending on the local context.
Job Charts/ Roles	Are there Job Charts for every post?	Yes, roles are defined	Yes, roles are defined
Reporting	What is the reporting structure?	Water Supply Core-Committee and internal meetings, reporting on hierarchical lines	Monthly meetings between the Executive Engineer and Commissioner of the City Corporation, hierarchical reporting
Decentralization	Role of local governments	Setting Water Tariffs [Commissioner of the City Corporation is the chairman of the water supply core-committee and reports to the local council]	Setting water tariffs
Problem Escalation	What is the mechanism of problem escalation?	Issues pertaining to the operation are discussed in the weekly meetings of the core-committee	Follows the hierarchical line of control again.

Table 0.10: Indicators of community engagement

Indicators (Qualitative/ Quantitative)	Measure	CMWS	PMWS
Water Adalat	Are there public water forums? What is the frequency and output of such forums?	No	No
Community Outreach	Number of educational presentations in a year	None. Not much of consumer/ community outreach. No public presentations.	By way of a facilitating NGO and a Social Intermediary and Communications Strategy
Community Opinion	What is the level of engagement of the community when it comes to decisions like revising water tariffs?	Informed through notices and pamphlets.	Not consulted, but informed post-revision
Overall Customer Satisfaction	Number of customers who rate water supply as good/ excellent (in the survey)	145	488

32. Annexure VIII: Discussion guide for beneficiary needs assessment exercise

The beneficiary needs assessment exercise attempted to answer the following questions:

- For what all purposes do consumers use water?[17]

[17] Options for purposes for which water is used: Drinking, cooking, house cleaning, washing clothes, sanitation/ hygiene (bathing, brushing, flushing, washing of hands), growing plants, rearing animals, other purposes.

- What are the various sources through which consumers meet their water needs?[18]
    - Do consumers already have metered connections?
- How many liters of water do consumers need per day? Does this change with seasons?
- How do consumers store their water? Does this change with seasons?
- How much time do consumers spend on collecting water per day? Does this change with seasons?
- How far and how often do consumers have to travel to collect water every day? Does this change with seasons?
- Do consumers invest in making water potable (time and/ or money)?
- How many hours of regular supply of water per day do consumers think will suffice? Does this change with seasons?
    - Do consumers wish to have a 24x7 water supply system?
    - Or would consumers prefer a 6x7 water supply system?
- How much do consumers pay for their current water needs?
- How much are consumers willing to pay/ can afford to pay for assured water supply?
- Are consumer inputs taken while making decisions regarding location/ placement of community standpipes/ taps?

3.2Annexure IX: KUWSDB, Belgaum - Water tariff table

This has been reproduced from the bills of KUWSDB, the Belgaum water supply maintenance division.

Consumer category	Volumetric tariff proposed by the City Corporation of Belgaum			
	Tariff Slab (KL/ month)		Tariff rate (INR/ KL)	Minimum charge per connection (INR/ month)
	Min.	Max.		
Domestic	0	8	6	48
	8	25	8	
	25	40	12	
	Above 40		20	
Non-domestic	0	25	16	128
	25	40	24	
	Above 40		40	
Commercial/ Industrial	0	25	32	256
	25	40	48	
	Above 40		80	

NOTE[19]:

- Non-payment of water bill within a month from last date of payment will lead to disconnection of the water supply.
- Non-receipt of bill is not a valid reason for non-payment.
- Arrears may be ignored if already paid.
- Interest at the rate of 1 percent per month will be levied for payment made after the last date of payment.

[18] Options for sources through which consumers meet their water needs: Municipal water/ public standpipe, dug well (protected, unprotected), borehole, shared community source/ water body (lake, river, pond, protected/ unprotected spring, etc.), rainwater, bottled water, tanker truck, other sources.

[19] Only some of the notes, which were relevant to water charges, have been reproduced here.