

Customer Satisfaction with Domestic Water Supply in India – A Study in Hubli city

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Abstract

Severe water crisis prevailed in twin Cities of Hubli-Dharwad in South India for a long time. During the last ten years, there has been considerable improvement in the water service. While most parts of the city is having intermittent supply system, a pilot 24/7 water service was implemented in a Demonstration Zone through the World Bank assistance, and State Government of Karnataka. The 24x7 project covers about 12 % of the total population of the city. The objective of this paper is to study the customer satisfaction in both intermittent and 24/7 water service areas in Hubli city. Stratified sampling method was adopted for four groups namely, low, medium, high income and backward classes namely the Scheduled Cast/Scheduled Tribes (SC/ST) groups. The results of the study revealed that most customers in 24/7 demo zone were highly satisfied with water quality, continuity, quantity, and pressure; whereas there was slight dissatisfaction (12%) with regard to redressal of customer complaints. In contrast, there was considerable dissatisfaction with water quality, continuity and pressure in intermittent supply areas. There was universal opinion from both 24/7 demo zone and intermittent service areas supporting 24/7 water service scale up project in the city.

Keywords: Intermittent Water Service, 24/7 Water Service, Customer Satisfaction

1. Introduction

Study of customer satisfaction is of prime importance in encouraging performance improvement of any service provider. This is true even in the case of government-owned organizations such as those which provide essential services such as water supply. In most developing countries, including India, infrastructure services are provided by state-owned organizations. Due to the monopolistic nature of the organizations, there is no or little inclination to ensure consumer satisfaction. The requirements and satisfaction of customers are low on priority in government owned organizations, mainly due to lack of professional approach in customer services. Satisfaction is defined as the fulfillment and gratification of the need for a stated good or service. The level of satisfaction is, therefore determined by the perceived performance of a company or utility, which is an evaluation of the delivered good or service viewed in the light of the consumers' needs. It is generally expected that a higher level of service quality is expected to lead to customer satisfaction and eventually to better customer loyalty and higher profits (Chen and Hu, 2010). Customer satisfaction is defined as the customer reaction to the state of fulfillment, and customer judgment of the fulfilled state Oliver (1997). The measurement of customer satisfaction is a useful means to achieve the objectives of business organizations through the analysis of the performance of the services or offerings to customers as well as to identify the areas of improvements as also customers' priorities, leading to customer segmentation (Kotler et al., 2006). It is a tool that can be used as a projective way to get into the mind of the customers, and getting continuous valuable feedback from the customers and is a key element in total quality management (Zairi, 1994). Al-Ghuraiz and Enshassi (2006) found that improving quality of service was the key to improving consumer satisfaction. Mugabi et al, (2007) suggests that poor customer service could lead to lukewarm attitude to bills payment. It could also lead to consumer resistance to increasing water tariffs as well as affect consumer willingness to pay. A few of the attributes that leads to higher consumer satisfaction include reliability of water supply at appropriate pressure, good quality

water, timely and accurate bills, responsiveness to general inquiries and resolving complaints, ease of obtaining new connections, convenience of bill payment process, appropriate customer care behavior, regular information updates regarding services as well as good office ambience. Vloerbergh et al., (2007) finds that consumer satisfaction was closely linked to acceptance and preferences. Al-Ghuraiz and Enshassi, 2006, based on a survey in Gaza strip for customer satisfaction reported that quality of service plays a key role in enhancing customer satisfaction, and that scarcity of water or unscheduled supply of water breeds conflicts between consumers and the water provider leading to customer dissatisfaction which leads to loss of revenue.

This study examines customer satisfaction with the two different systems of water supply that exist in parallel in the city of Hubli, i.e. the 24X7 water supply system as well as the intermittent water supply system. This paper is arranged as follows. Section 2 contains review of a few studies regarding customer satisfaction in water supply, section 3 describes the methodology adopted in this study, while section 4 discusses the findings of this study and section 5 concludes with the recommendations of the study.

2. Methodology

2.1 Description of the Study Area

Hubli-Dharwad twin city is the second largest city after Bengaluru, in Karnataka state having a population of 943857 as per 2011 Census, with a population density is 2362 per sq. km. Drinking water provision is made from two surface water sources namely Neersagara and Malaprabha reservoirs. Water supply in Hubli-Dharwad, is operated and managed by the Karnataka Urban Water Supply and Drainage Board (KUWS & DB), since 2003 (GoK, 2003). These cities have dual water supply system, with 4 wards (area of 3.29 Sq.Kilometres in Hubli Demo zone and total area of Hubli-Dharwad is 202 Sq.Kilometres) each in Hubli and Dharwad having 24X7 water supply and the remaining areas having intermittent water supply. 24X7 water supply in the cities are characterized by continuous water supply at constant pressure throughout the day, with higher per unit of water supply, while in the intermittent water supply system, water is supplied once in two days for about 4 hours a day, which include low pressure water supply in a few elevated areas in the cities (in about 10% area).

2.1.1 History of Water supply in the study area

Until the year 1995, the capacity of Hubli-Dharwad water supply system had been augmented from time to time depending on the population growth in the city. The water distribution network was laid with good quality pipes with zoned system as per approved designs. Though the supply of water was intermittent, it was fairly good with metering and volumetric billing. In the ensuing period till 2003, there was no periodical augmentation of bulk and distribution system commensurate with the growth of city. The existing system was extended beyond its capacity to cover the new extensions by breaking the zoned system. Due to inequitable pressure in the distribution system, majority of water meters were by-passed. The un-authorized layouts and slums were laid with un-planned water distribution network with sub-standard quality of pipes. All the above factors resulted in poor water service with a supply frequency of once in seven days. The water supply system under the Hubli-Dharwad Municipal Corporation (HDMC) was characterized by several deficiencies; (a) partial water service network coverage, (b) illegal connections to an extent of more than 30 percent, (c) absence of metering, and (d) huge gap between expenditure and revenue of nearly Rupees 196 million in 2000-01.

Following the change in management regime in 2003, water supply system in the city witnessed several technical and managerial improvements including the 24X7 water supply services in a few wards of the cities (GoK 2005). Replacement of old pre-stressed concrete transmission mains with new mild steel main, old pump sets with new high efficiency pump sets, etc., were carried out to enhance bulk supply quantity from about 70 MLD to 105 MLD in July 2004 and the average per capita supply at tap was about 90 LPCD. There was further augmentation of bulk supply in September 2011 to enhance the bulk supply to about 185 MLD. In the distribution system, several feeder mains were newly installed and few damaged service pipes were also replaced, which resulted in improved water service levels in the twin cities and the minimum per capita supply of 135 LPCD was ensured. The other improvements include increase in frequency of water supply, improved quality of water, better billing and collection practices, as well as improvements in consumer complaints resolution.

In 24X7 water service demonstration zone in Hubli, about 12 percent population has been covered. The main performance targets achieved in the demonstration zones were, continuous pressured water supply to every customer with a minimum day time pressure of 6 m (from 6 am to 10 pm) and minimum night time pressure of 2 m (from 10 pm to 6 am), 100 percent metering, maintenance of computerized records of meter readings, reduction of the losses, modernized that billing and collection system that generated bills on volumetric basis and operation of 24-hour Customer service centre.

2.2 Empirical methods

The normal practice of measurement of satisfaction by service providers is to measure consumers' satisfaction on past performance. Vloerbergh et al., (2007) explained that the survey design could vary from survey questions to unstructured interviews and everything in between using comparative and non-comparative scales. In comparative scaling, the respondents are asked to compare one product against the other while non-comparative

scaling is used to evaluate a single product. In this study, Likert Scales is used in this study for measurement of customer satisfaction on water supply service in intermittent water supply area and 24/7 water supply areas (Likert 1932).

2.2.1 Sampling

A stratified sample was selected for this study to ensure reliable levels of estimates. The stratification was done at two levels; on the first level, the locations were bifurcated as intermittent water supply and the 24X7 water supply areas based on the regularity of water supply, following which the respondents were selected based on locations of income group areas such as low income group (LIG), medium income group (MIG), high income group (HIG) and scheduled caste and scheduled tribes (SC/ST) groups separately in intermittent water supply and 24X7 water supply areas. Since there were several initiatives by the Government of Karnataka, to improve the access to piped water supply to the SC/ST community, they were also included as a separate group in this study. The stratification and the substrata are given in Table 1.

Table 1. Details of sampling in Hubli city

Location	Primary sample distribution				
	Low income group	Middle income group	High income group	SC/ST group	Total
24x7 Water service area					
24x7 Demo zone, Hubli	120	120	120	120	480
Intermittent Water service areas					
HDMC Tank Master zone	60	60	60	60	240
Keshwa pur Master zone	60	60	60	60	240
Nehru nagar Master zone	60	60	60	60	240
Old Hubli Master zone	60	60	60	60 (50)*	240 (230)
Sainagar Master zone	60	60	60	60	240
Tabib land Master zone	60	60 (61)	60	60	240 (241)
Sub total	360	360 (361)	360	360	1440 (1431)
Total	480	480 (481)	480	480 (470)	1920 (1911)

*Figures in brackets indicate no. of respondents from whom data was collected

A random sample of 1920 respondents was selected from the consumer database, which included 480 respondents who were having 24X7 water supply (25.2% of the sample) and 1440 (74.8% of the sample) having intermittent water supply i.e. who are provided with piped water supply once in two or three days a week.

2.2.2 Structure of the questionnaire

The survey questionnaire was structured into four sections, where the first part pertains to the data on information on existing facilities for water supply and service details; the second part deals with customer satisfaction with water supply service, third part for data pertaining to willingness to pay by using the open ended CV with an introductory note and bidding game approach, and finally part four collects information about household demographics. The questionnaire was designed in the local Kannada language and also in English with majority being closed questions with two to four options. Each questionnaire was administered with a cover note duly explaining the purpose of survey and completed by using well-trained enumerators. The household survey was carried out during May-June 2012. A pre-test survey was conducted prior to the actual data collection, to enable addressing issues in obtaining appropriate data and the field staff was trained in administering the questionnaire. The in-person interview was lasted for an average of 30 minutes and the response rate for the entire study sample was more than 99 percent.

Table 2. Response rate in data collection

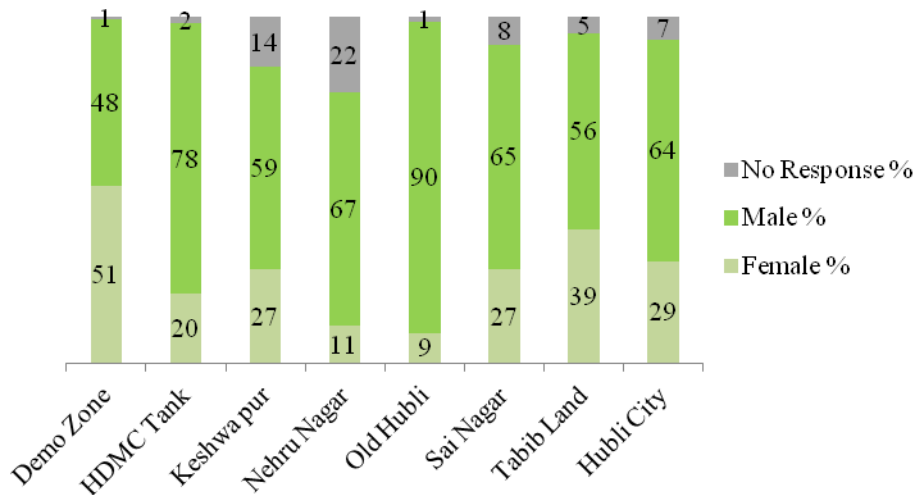
Sample details	24X7 Demo zone	Intermittent supply zone	Total
Sample selected	480	1440	1920
Sample responded	480	1431	1911
Percentage response	100	99.38	99.53

The high response rate can be attributed to the crisis conditions prevailed in the city for a long time and also active role of experienced enumerators involved in the survey (Table 2).

3. Results of the study

3.1 Characteristics of the households

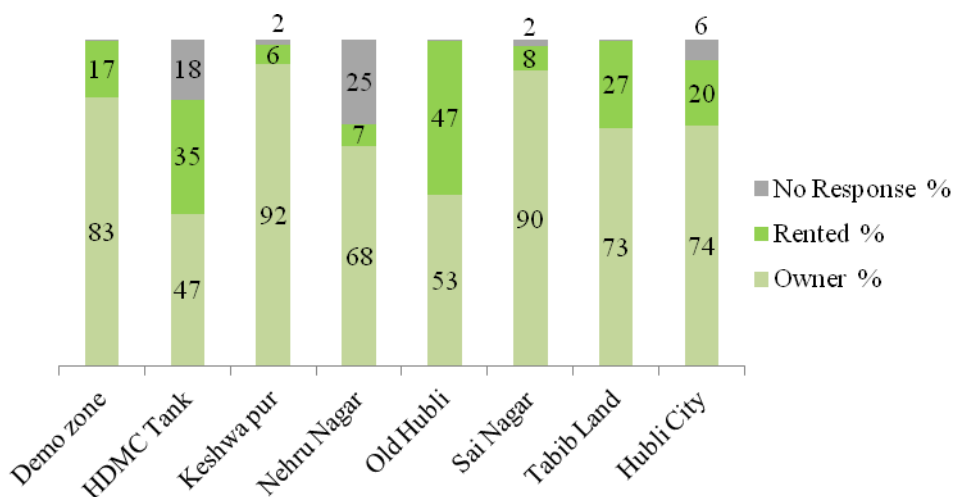
The figure 1 below provides the socio-demographic characteristics of the respondents. It reveals that nearly 64 percent of the respondents were men and 29 percent of the respondents were women, though there were variations in the proportion of men and women respondents across the locations. There were no responses among remaining 7 percent of the respondents.



• Figure 1: Gender of the respondents

3.2 Ownership of dwelling

The customer survey shows that nearly 74 percent of the respondents were owners of the houses they dwelled, 20 percent of the respondents were tenants, while there were no responses among remaining 6 percent of the respondents (Figure 2).



• Figure 2: Ownership of dwelling

3.3 Education of the households

Examination of the education levels of the households indicates that a small portion of (8%) respondents had their education closed before obtaining secondary School Leaving Certificate (SSLC). The respondents who have gone up to the Pre-University Class (PUC) levels are at 47 percent. or had diplomas. The proportion of respondents with diploma education was fewer. There is considerable proportion (37%) of respondents with graduate and post-graduate education (Figure 3).

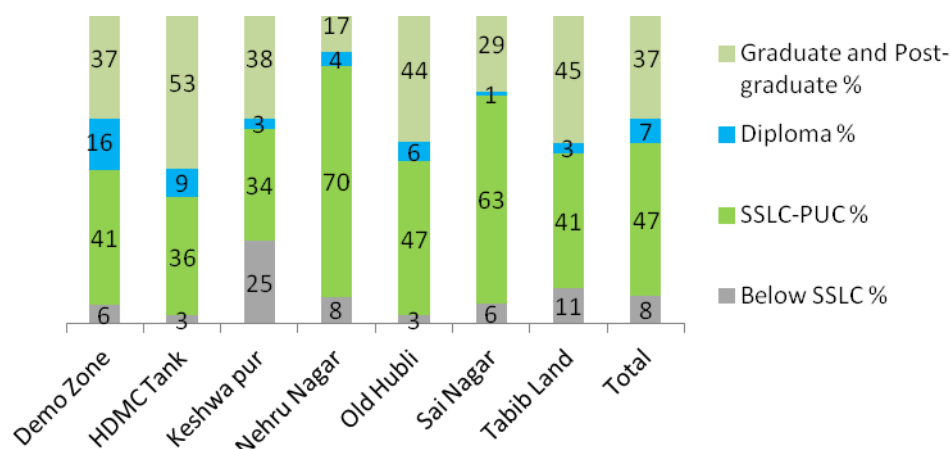


Figure 3: Education levels of respondents

3.4 Water requirements of households

The study reveals that most (nearly 65 %) households had water requirements of more than 10 buckets (Each bucket measures about 20 liters) a day, with an average requirement of 21 buckets per day (Table 3), which is equivalent to about 400 liters. The standard unit rates of requirement were published by the Central Public Health Environmental Engineering Organization (CPHEEO) under the Ministry of Urban Development, Govt. of India, in a manual (CPHEEO Manual, 1999). As per this manual, the domestic requirement of water is 135 liters per capita per day (L/c/d). For a family of five members, the requirement of water works out to 675 liters/day (L/d), which is more than the requirement of respondents. Table 4 indicates that majority (66%) of the households required between 3 and 10 buckets of water for drinking purposes.

Table 3: Household water requirements

HH water requirement	24x7 Demo zone	HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land	City Total
3 buckets*	-	-	5** (2.08)** *	-	-	-	-	5 (0.23)
3-10 buckets	81 (16.88)	68 (28.33)	157 (65.42)	29 (12.08)	83 (36.09)	3 (1.25)	36 (14.94)	485 (22.58)
>10 buckets	384 (80.00)	104 (43.33)	68 (28.33)	210 (87.50)	40 (17.39)	221 (92.08)	144 (59.75)	1380 (64.25)
No Response	15 (3.13)	68 (28.33)	10 (4.17)	1 (0.42)	107 (46.52)	16 (6.67)	61 (25.31)	278 (12.94)
Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	2148 (100)
Average water requirement (Buckets)	22.89	12.10	11.40	29.15	10.28	29.16	21.99	21.02

*Capacity of 1 bucket is about 20 Liters

**Figures indicate number of respondents

***Figures in brackets indicate percent of respondents

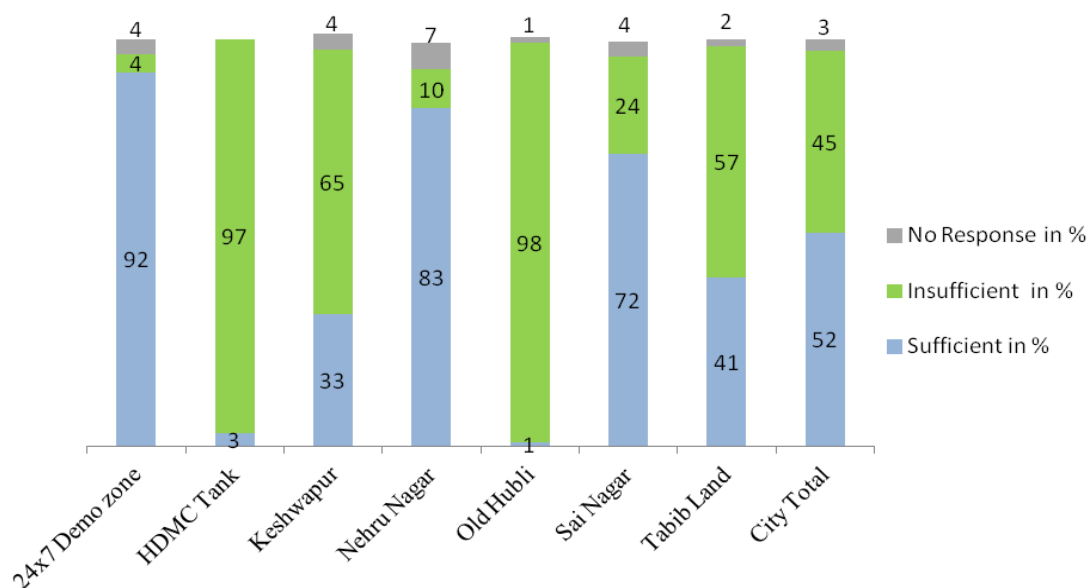


Figure 4: Extent of sufficiency of water availability
 Most respondents across three regions namely, HDMC Tank area, Keswa pura and Old Hubli areas indicated that the water supplied through the piped water system was not sufficient to meet their water requirements. These areas are located on tail end of feeder main. While majority of respondents another two regions, Nehru nagar and Sai nagar reported sufficiency in quantity of water supplied. These areas are located on initial reaches of feeder main with higher pressure (Figure 4). Several respondents (29 %) indicated that public taps as the main source of water to supplement their water requirements, about 11 percent respondents have their own bore wells and majority of the respondents (59%) did not provide responses as to what their supplementary sources of water were (Table 4).

Table 4: Modes of making up for water shortages

Supplementary sources of water	Demo zone	HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land	Total
Own Bore well	1 (0.21)	-	3 (1.25)	-	41 (17.83)	1 (0.42)	1 (0.41)	233 (10.85)
Tankers	4 (0.83)	-	2 (0.83)	6 (2.50)	-	3 (1.25)	4 (1.66)	26 (1.21)
Public Tap	103 (21.46)	-	36 (15.00)	158 (65.83)	-	211 (87.92)	102 (42.32)	625 (29.10)
Others	(0.00)	-	1 (0.42)	-	-	-	-	3 (0.14)
No Response	372 (77.50)	240 (100)	198 (82.50)	76 (31.67)	189 (82.17)	25 (10.42)	134 (55.60)	1261 (58.71)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	2148 (100)

Typically, households spent between Rupees 50 to Rupees 200 on water, every month, with more than half of the respondents indicating Rs. 50 -200 as their monthly expense on water. This was pattern was seen across the city locations, except in Keshwa pur and Tabib land (Table 5).

Table 5: Household Monthly Expenditure on Water in Rupees

Monthly expenditure on water	Demo zone	HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land	Total
<Rs. 50	91 (18.96)	66 (27.50)	60 (25.00)	44 (18.33)	63 (27.39)	39 (16.25)	98 (40.66)	491 (22.86)
Rs. 50-200	306 (63.75)	121 (50.42)	94 (39.17)	186 (77.50)	107 (46.52)	120 (50.00)	94 (39.00)	1182 (55.03)
>Rs. 200	72 (15.00)	50 (20.83)	77 (32.08)	-	60 (26.09)	76 (31.67)	31 (12.86)	389 (18.11)
No Response	11 (2.29)	3 (1.25)	9 (3.75)	10 (4.17)	-	5 (2.08)	18 (7.47)	86 (4.00)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	2148 (100)

3.5 Overall level of satisfaction with water supply

The higher levels of satisfaction with water supply is expected to be positively related to several factors such as satisfaction with water quality, and other parameters such as water quality, water pressure, quantity of water supplied and frequency of water supply. Price of water is not expected to play a role in customer satisfaction, given that water was an essential commodity and being supplied by government-owned institutions, there was no differential pricing of water.

The response level of satisfaction (Table 6), indicates that all the respondents in the 24X7 water service area were satisfied with water supply, due to the fact that water was available throughout the day, and hence were spared the hassles of needing to be alert on the timing of water supply as well as not having to stock water for use. The level of satisfaction in the intermittent service areas was a little lower (94.41%) in the intermittent water supply areas.

Table 6: Overall Satisfaction with Water Supply in the study area

Levels of satisfaction	24x7 Demo Zone	Intermittent water supply areas						Total	City Total
		HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land		
Neutral	-	-	8 (3.33)	-	-	-	5 (2.07)	13 (0.91)	13 (0.68)
Satisfied	465 (96.88)	228 (95.00)	222 (92.50)	232 (96.67)	222 (96.52)	227 (94.58)	220 (91.29)	1351 (94.41)	1816 (95.03)
Highly satisfied	11 (2.29)	10 (4.17)	9 (3.75)	-	8 (3.48)	13 (5.42)	9 (3.73)	49 (3.42)	60 (3.14)
No Response	4 (0.83)	2 (0.83)	1 (0.42)	8 (3.33)	-	-	7 (2.90)	18 (1.26)	22 (1.15)
Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)

The various aspects that led to satisfaction among customers which include water pressure, water quality, continuity in water supply, availability of appropriate quantum of water and water pressure as well as redressal of customer complaints have been examined in Table 7 to Table 13.

3.5.1 Satisfaction with water schedule of water supply

Table 7 indicates that most of the respondents were satisfied with the schedule of water supply, with more than 85 percent of the respondents, for the city as a whole, indicating satisfaction. However, there was a dip in the percentage of respondents satisfied in the HDMC tank zone, which is located on tail end of transmission main and also the network is very old. As expected, nearly all the respondents (99%) in the Demo Zone indicated that they were satisfied with the schedule of water supply because water was available to them 24X7 i.e. throughout the day all through the year.

Table 7: Customer satisfaction with Schedule of Water Supply

Levels of satisfaction	24x7 Demo Zone	Intermittent water supply areas							City Total
		HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land	Total	
Highly Dissatisfied	-	-	-	1 (0.42)	-	-	-	1 (0.07)	1 (0.05)
Dissatisfied	-	56 (23.33)	-	1 (0.42)	1 (0.43)	-	-	58 (4.05)	58 (3.04)
Neutral	-	3 (1.25)	2 (0.83)	3 (1.25)	-	2 (0.83)	1 (0.41)	11 (0.77)	11 (0.58)
Satisfied	471 (98.13)	177 (73.75)	236 (98.33)	226 (94.17)	228 (99.13)	229 (95.42)	229 (95.02)	1325 (92.59)	1796 (93.98)
Highly satisfied	4 (0.83)	2 (0.83)	1 (0.42)	1 (0.42)	1 (0.43)	9 (3.75)	4 (1.66)	18 (1.26)	22 (1.15)
No Response	5 (1.04)	2 (0.83)	1 (0.42)	8 (3.33)	-	-	7 (2.90)	18 (1.26)	23 (1.20)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)

3.5.2 Satisfaction with continuity of water supply

Table 8 shows that there was nearly 100 percent satisfaction with water continuity in 24X7 service areas, as water was available throughout the day at constant pressure, while even in the case of intermittent service areas, a meager 5.38 percent of the respondents were not satisfied with continuity of water, which was due to water stoppage during power outages in zones without storage facilities.

Table 8: Levels of Satisfaction with continuity of Water

Levels of satisfaction	24x7 Demo zone	Intermittent water supply areas							City Total
		HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land	Total	
Highly Dissatisfied	-	-	-	1 (0.42)	-	-	-	1 (0.07)	1 (0.05)
Dissatisfied	-	56 (23.33)	-	1 (0.42)	1 (0.43)	-	-	58 (4.05)	58 (3.04)
Neutral	-	3 (1.25)	2 (0.83)	3 (1.25)	-	2 (0.83)	1 (0.41)	11 (0.77)	11 (0.58)
Satisfied	471 (98.13)	177 (73.75)	236 (98.33)	226 (94.17)	228 (99.13)	229 (95.42)	229 (95.02)	1325 (92.59)	1796 (93.98)
Highly satisfied	4 (0.83)	2 (0.83)	1 (0.42)	1 (0.42)	1 (0.43)	9 (3.75)	4 (1.66)	18 (1.26)	22 (1.15)
No Response	5 (1.04)	2 (0.83)	1 (0.42)	8 (3.33)	-	-	7 (2.90)	18 (1.26)	23 (1.20)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)

3.5.3 Satisfaction with Quantity and Pressure of Water Supply

Table 9 indicates that most of the respondents, in both the intermittent water supply regions and 24X7 zones were satisfied with the quantity of water being supplied (90.08 % and 96.67%, respectively). These improvements were possible on account of various initiatives undertaken by the Water Board viz., augmenting bulk water supply at Malaprabha source, and reducing the extent of water lost in the system resulting in increase in quantity of water available to customers. Examination of Table 10 indicates that majority of the customers were also satisfied with the pressure at which water supplied in both the regions. The lower levels of satisfaction in the non-24X7 regions was on account of pipes leaking due to aged infrastructure and the lack of pressure reducing valves, causing low pressures on tail-ends and ridge areas. These issues were addressed while implementing the 24X7 schemes in the cities, where new pipelines were installed together with pressure reducing valves (PRV) at selected points so as to maintain the required pressure of more than 6 m.

Table 9: Satisfaction with Quantity of Water Supplied

Levels of satisfaction	24x7 Demo zone	Intermittent water supply areas						Total	City Total
		HDMC Tank	Keshwapur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land		
Highly Dissatisfied	1 (0.21)	-	-	-	-	1 (0.42)	-	1 (0.07)	2 (0.10)
Dissatisfied	1 (0.21)	-	1 (0.42)	2 (0.83)	-	3 (1.25)	8 (3.32)	14 (0.98)	15 (0.78)
Neutral	51 (10.63)	4 (1.67)	3 (1.25)	19 (7.92)	2 (0.87)	10 (4.17)	9 (3.73)	47 (3.28)	98 (5.13)
Satisfied	415 (86.46)	227 (94.58)	229 (95.42)	208 (86.67)	222 (96.52)	219 (91.25)	212 (87.97)	1317 (92.03)	1732 (90.63)
Highly satisfied	7 (1.46)	7 (2.92)	5 (2.08)	3 (1.25)	6 (2.61)	7 (2.92)	5 (2.07)	33 (2.31)	40 (2.09)
No Response	5 (1.04)	2 (0.83)	2 (0.83)	8 (3.33)			7 (2.90)	19 (1.33)	24 (1.26)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)

Table 10: Satisfaction regarding pressure

Levels of satisfaction	24x7 Demo zone	Intermittent water supply areas						Total	City Total
		HDMC Tank	Keshwapur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land		
Highly Dissatisfied	-	-	1	-	-	-	-	1 (0.07)	2 (0.10)
Dissatisfied	1	-	1	1	-	4 (1.67)	3 (1.24)	11 (0.77)	14 (0.73)
Neutral	4	1	2	10	1	21 (8.75)	13 (5.39)	66 (4.61)	84 (4.40)
Satisfied	93	93	96	85	98	212 (88.33)	216 (89.63)	1314 (91.82)	1761 (92.15)
Highly satisfied	1	5	-	1	1	3 (1.25)	2 (0.83)	21 (1.47)	27 (1.41)
No Response	1	1	-	3	-	-	7 (2.90)	18 (1.26)	23 (1.20)
Grand Total	100	100	100	100	100	240 (100)	241 (100)	1431 (100)	1911 (100)

3.5.4 Satisfaction with Quality of Water Supply

One of the most important aspects for satisfaction regarding water supply is the satisfaction with the quality of water that is being supplied. Table 11 indicates that more than 97 percent of the respondents in the 24X7 zone were satisfied with the quality of water supplied, while the level of satisfaction was lesser in the non-demo zones, with only about 93 per cent of the respondents indicating that they were satisfied. The levels of satisfaction with quality of water varied across the city with reduced levels of satisfaction, particularly in the HDMC Tank regions. The lower levels of satisfaction in the intermittent water supply areas was on account of seepage of polluted or contaminated water into water mains due to the low pressure created inside the water mains when empty (on account of intermittent water supply). In HDMC tank zone there were frequent leakages in pipes coupled with low pressure leading to ingress of outside water

Table 11: Satisfaction with Quality of Water

Levels of satisfaction	of 24x7 Demo zone	Intermittent water supply areas							City Total
		HDMC Tank	Keshwapur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land	Total	
Highly Dissatisfied	1 (0.21)	-	-	-	-	1 (0.42)	-	1 (0.07)	2 (0.10)
Dissatisfied	-	1 (0.42)	-	1 (0.42)	-	8 (3.33)	-	10 (0.70)	10 (0.52)
Neutral	8 (1.67)	57 (23.75)	4 (1.67)	10 (4.17)	-	11 (4.58)	12 (4.98)	94 (6.57)	102 (5.34)
Satisfied	464 (96.67)	175 (72.92)	232 (96.67)	219 (91.25)	229 (99.57)	213 (88.75)	221 (91.70)	1289 (90.08)	1753 (91.73)
Highly satisfied	2 (0.42)	5 (2.08)	3 (1.25)	2 (0.83)	1 (0.43)	7 (2.92)	1 (0.41)	19 (1.33)	21 (1.10)
No Response	5 (1.04)	2 (0.83)	1 (0.42)	8 (3.33)	-	0.00	7 (2.90)	18 (1.26)	23 (1.20)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)

3.5.5 Satisfaction with Consumer Complaint Redressal and Staff Behavior

With regard to complaints redressal, about 92 percent respondents were satisfied in case of intermittent service area, whereas only 88 percent respondents were satisfied in 24/7 service area. The dissatisfaction to an extent of 12 percent in 24X7 service area was due to disputes in bills with huge consumption and meter thefts (Table 12). Table 13 indicates that the proportion of customers who were satisfied was slightly larger in the intermittent supply areas compared to the Demo Zones, which was mainly due to which was mainly due to higher bills issues and indicates that there needs to be training of staff in better consumer-facing behavior as well as technical skills in resolving issues in the first instance itself.

Table 12: Consumer Satisfaction with Resolution of Complaints

Levels of satisfaction	of 24x7 Demo zone	Intermittent water supply areas						City Total	
		HDMC Tank	Keshwapur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land		
Highly Dissatisfied	1 (0.21)	-	-	-	-	-	-	1 (0.05)	
Dissatisfied	30 (6.25)	-	2 (0.83)	5 (2.08)	-	3 (1.25)	4 (1.66)	14 (0.98)	44 (2.30)
Neutral	10 (2.08)	2 (0.83)	7 (2.92)	13 (5.42)	-	11 (4.58)	13 (5.39)	46 (3.21)	56 (2.93)
Satisfied	425 (88.54)	226 (94.17)	224 (93.33)	213 (88.75)	223 (96.96)	220 (91.67)	214 (88.80)	1320 (92.24)	1745 (91.31)
Highly satisfied	9 (1.88)	10 (4.17)	6 (2.50)	1 (0.42)	7 (3.04)	6 (2.50)	3 (1.24)	33 (2.31)	42 (2.20)
No Response	5 (1.04)	2 (0.83)	1 (0.42)	8 (3.33)	-	-	7 (2.90)	18 (1.26)	23 (1.20)
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)

3.5.6 Satisfaction with Staff Behavior and Attitude

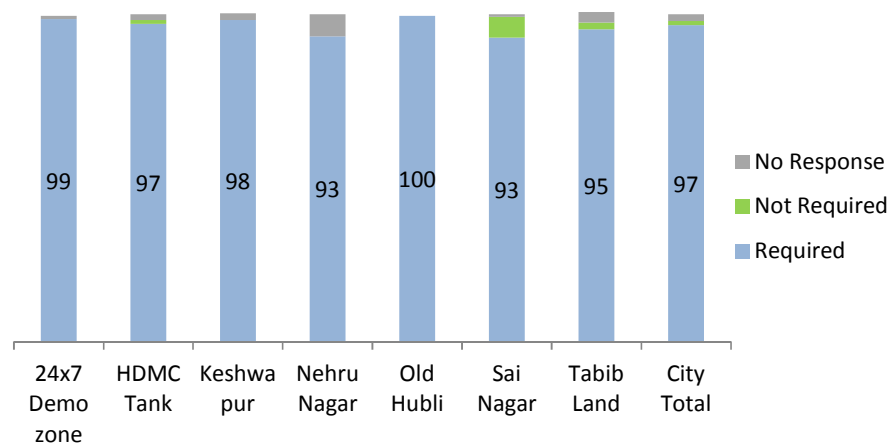
Table 13 indicates that the proportion of customers who were satisfied with staff behavior and attitude was larger in both intermittent supply areas (93.5%) and 24x7 Demo zone (92.3), which was mainly due to dedicated staff for improvement in water service provision.

Table 13: Satisfaction with Staff Behavior and Attitude

Levels of satisfaction	24x7 Demo zone	Intermittent water supply areas							Total	City Total
		HDMC Tank	Keshwa pur	Nehru Nagar	Old Hubli	Sai Nagar	Tabib Land			
Highly Dissatisfied	-	-	-	-	-	2 (0.83)	-	2 (0.14)	2 (0.10)	
Dissatisfied	-	-	3 (1.25)	1 (0.42)	-	3 (1.25)	1 (0.41)	8 (0.56)	8 (0.42)	
Neutral	32 (6.67)	3 (1.25)	5 (2.08)	7 (2.92)	-	6 (2.50)	10 (4.15)	31 (2.17)	63 (3.30)	
Satisfied	436 (90.83)	229 (95.42)	228 (95.00)	219 (91.25)	227 (98.70)	221 (92.08)	216 (89.63)	1340 (93.64)	1776 (92.94)	
Highly satisfied	7 (1.46)	6 (2.50)	3 (1.25)	5 (2.08)	3 (1.30)	8 (3.33)	7 (2.90)	32 (2.24)	39 (2.04)	
No Response	5 (1.04)	2 (0.83)	1 (0.42)	8 (3.33)	-	-	7 (2.90)	18 (1.26)	23 (1.20)	
Grand Total	480 (100)	240 (100)	240 (100)	240 (100)	230 (100)	240 (100)	241 (100)	1431 (100)	1911 (100)	

3.6 Willingness for 24X7 Water Supply

Opinion of the customers across various regions was elicited regarding the scaling up of 24 X 7 water supply throughout the city, and the responses indicate that a majority (97%) was in favor of extending the 24X7 services throughout the city (Figure 5). Discussions with the respondents indicated that the 24X7 water supply would reduce the need to store water and discard stored water and convenience in the form of not having to wake up at odd hours or return home early from work to collect water in the intermittent water supply as being the main reason for preferring 24X7 water services.



• Figure 5: Opinion regarding Scaling Up of 24X7 Water Supply

4. Summary and Conclusions

Customer satisfaction plays prime role in assessing the performance of an organization as well as in identifying areas of improvement. The results of this study reveals that majority of the customers in Hubli city, particularly in the 24X7 (Demo zones) were satisfied with the performance of the water supply-service provider in the city i.e. The Karnataka Water Supply & Drainage Board. The characteristics / aspects of the service that contributed to customer satisfaction include water quality, continuity, quantity, and pressure, while there was slight dissatisfaction (12 percent) with regard to redressal of customer complaints, particularly in the 24X7 zones. The dissatisfaction was related to the bill disputes that were carried over from the intermittent water supply period. In contrast, there was higher level of dissatisfaction with water quality, continuity and pressure in the intermittent service areas. Water quality issues, unscheduled supply and inequitable pressure in water supply which inherent with the intermittent supply system across various cities in most countries were found to be issues even in Hubli city. These performance issues could be addressed either through a piece-meal approach, wherein, small investments are made to make minor improvements to infrastructure, or there could be a one-time investment in overhauling the entire water distribution system in the city as in the case of 24X7 zones. The 24X7 water supply which is the benchmark set for water supply across the globe can help in resolving most performance issues identified in this study. The results of the study also indicate there was overwhelming affirmative response to scaling up the 24X7 water supply services throughout the city to enable all citizens to

enjoy the benefits of such service. A few recommendations that arise from this study include that 24X7 water supply services need to be extended throughout the city, as well as that a consumer complaints redressal cell needs to be established at the department itself rather than depend on the complaints cell at the HDMC. Training of staff in better handling customer technical and other requirements such as billing and payments would also play a role in improving the image of the service provider.

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