CHAPTER -5

ANALYSIS OF PACKAGED DRINKING WATER SUPPLY

5.1 INTRODUCTION

In the previous chapter the drinking water infrastructure of the selected schools was analyzed and the perception of the students and teachers towards the drinking water amenities were discussed. The context of the present chapter deals with the analysis of packaged drinking water from the market, where the school's daily requirement of the packaged drinking water is analyzed which show the cost per day per students for different categories of the schools.

The opening segment is about the observations made during the survey on the packaged drinking water which prepares the grounds for analysis of the packaged drinking water.

During the survey it was found that only one school procures the packaged drinking water from the market to meet the daily need of the school for drinking water. The local supplier makes the supply of RO drinking water in the bottle size of 20 liters. The market offers various size of the packaged drinking water from small to large containing 250 ml, 500 ml, 750 ml, 1 liter, 2 liters , 5 liters, 20 liters and can be customized according to the requirement/s.

From the informal discussion with the management of different schools it was known that the school/s prefer/s 20 liters sized packaged bottled which suit/s the cost and meet/s their daily requirement. The cost of other small size packaged bottles is not suitable and cost more. It was also revealed that the school uses daily 4 to 5 units of packaged water bottle to meet the daily needs of students and teachers.

The bottled water on daily basis was supplied by the local RO water supplier , where the daily requirement was not fixed and it varied based on the daily consumption. On certain days only 3 bottles were used and 2 bottles were kept for next day. The management used to keep an average of 5 bottle on daily basis to meet the daily drinking water need.

It was revealed that cost of packaged drinking water earlier cost ₹ 15 per bottle before covid-19. During last two years since 2020 the rates of bottled water has increased to ₹ 25 which is the recent price paid by the management in 2022.

From the observations and feedback of the management, the analysis of packaged drinking water from the local RO water supplier is conducted to know the cost of drinking water and willingness of the stakeholder to accept or to pay.

5.2 WILLINGNESS TO ACCEPT AND WILLINGNESS TO PAY

In economics, Willingness to Accept (WTA) is the minimum monetary amount that a person is willing to bear a negative externality, such as pollution. This is in contrast to Willingness to Pay (WTP), which is the maximum amount of money a consumer (a buyer) is willing to sacrifice to purchase a good/service or avoid something undesirable. The price of any transaction will thus be any point between a buyer's willingness to pay and a seller's willingness to accept; the net difference is the economic surplus (DBpedia, n.d). The concept of willingness to pay is contrary to the concept of Willingness to Accept which is explained to understand the difference.

The Willingness to Accept with respect to drinking water is explained to make the clear understanding of the concept. If people are ready to accept the water without any purification like RO filtered water, then people are willing to accept the water quality with no surety of safety of water (negative externality) ready to pay minimum amount for that water quality. Here, the similar situation can be observed with present situation of the schools where they are depends on the water quality supplied in the schools at the minimum cost paid to the VMC in form of water tax (VMC, n.d) but without RO purifiers.

If people want to avoid undesirables, they are ready to pay the maximum which is called Willingness to Pay. This can be contextualized to the present situation of the schools where the schools are willing to pay more price to avoid negative externalities of water by installing RO purifiers and making it part of infrastructure and state of art amenities.

The concept of the Willingness to Accept and Willingness to Pay for water quality is at the choice of the stakeholders, whether they are willing to accept the negative externalities or willing to pay to avoid the negative externalities. The willingness to accept can cause serious negative externalities to health of the students, teachers and other staff as discussed in chapter 1 (Table 1.2 and 1.3)

Foregrounding the concept of WTP a detailed analyses pertaining to the cost of packaged drinking water is undertaken.

5.2 PRIVATE SECTORS AND PACKAGED DRINKING WATER

Packaged drinking water supply by private sector is important source of drinking water for schools to meet their daily requirement either in case of shortage or in case of contamination of existing water source or due to the technical break down of water infrastructure or repair work.

Why to choose private sector for drinking water supply?

The benefits of choosing packaged drinking water suppliers in schools are listed below:

- Ensure the water quality as per ISO
- Timely supply and assured quantity
- Ensure hygiene
- reduced burden on management
- Fixing of responsibilities
- No bearing of Operational and Maintenance costs on schools

Besides the above reasons, the main reason for choosing or not choosing private packaged drinking water supplier is entirely dependent on the economic aspect of drinking water and willingness to pay. The section below discusses the economic aspect of packaged drinking water.

How much private packaged drinking water cost to school?

Economic aspects are very important decision making for selecting and rejecting activity. The economic aspect of the packaged drinking water covers the a) the quantities of the bottled water and respective prices b) quantities of the bottled water and delivery charges.

To begin with economic aspect of drinking water of packaged bottles, the broad outline of the analysis is given, which helps us to know the details of the analysis and how analysis is done and what are the basis of analysis.

The quotation from the local water supplier was collected on:

- different quantities of bottles and their respective price
- different quantities of bottles and delivery charges within 3 kms.
- different quantities of bottles and delivery charges within 10 kms.
- different quantities of bottles and delivery charges within 20 kms.

For deciding the different quantities of the bottle, the researcher has classified the schools into three categories;

- Small schools (Less than 200 students)
- Medium Schools (400 to 800 students)
- Large Schools (Above 1000 students)

The above classification of the schools is done on the basis of selected schools surveyed in the Vadodara city where the average number of the students enrolled in the schools was approximately 600.

The quotations also mention the charges on the basis of delivery area of distribution of water to the schools, for this purpose the researcher has classified the distribution charges into three area. Area within 3 kilometers, area within 10 kilometers and area within 20 kilometers. The intention of the researcher is to cover the city area of Vadodara city.

5.4 Descriptive Analysis

The descriptive analysis of the packaged drinking water gives the statistical information on quantities of the bottles and their respective prices. It also gives the statistical information on the delivery charges within 3 kms , within 10 kms. and 20 kms. of distance. The analysis is categorized as

- Small Schools
- Medium Schools
- Large Schools

Analysis of Small School

Table-5.1

Cost of Packaged Water for 5 Unit

Quantity	Stats	Charges in ₹	Upto_3Kms	Upto_10Kms	Upto_20Kms
	Mean	24.09	118.18	163.64	231.82
	N	11	11	11	11
5	Std. Deviation	2.39	25.22	32.33	56.00
	Minimum	21	100	100	150
	Maximum	30	150	200	300

Source: Authors compilation from the data collection

Table 5.1 gives the information on the cost of packaged drinking water with respect to 5 units of packaged drinking water and the delivery charges. The Table shows that the cost of 5 units of bottled water cost ₹ 24.09 from the price received by 11 water suppliers. The maximum price quoted was ₹ 30 and the minimum was ₹ 21 from the local suppliers. For the delivery charges of the 5 unit of bottled water within the 3 kilometers (kms) distance was ₹ 118.18. For delivery within 10 kilometers (kms) and 20 kilometers (kms) the average delivery charges of ₹ 163.64 and ₹ 231.82 respectively.

Table-5.2

Cost of Packaged Water for 10 Unit

Quantity	Stats	Charges in ₹	Uptp_3Km	Upto_10Km	Upto_20Km
	Mean	23.91	118.18	163.64	231.82
	N	11	11	11	11
10	Std. Deviation	2.43	25.23	32.33	56.03
	Minimum	21	100	100	150
	Maximum	30	150	200	300

Source: Authors compilation from the data collection

Table 5.2 shows that 10 units of bottles cost ₹ 23.91 showing maximum quotation of ₹ 30 and minimum ₹ 21. For delivery charges within 3 kms the supplier charges 118.18. The delivery charges within 10 kms was ₹ 118.18 and 20 kms was ₹ 231.82.

Thus, for small schools the quantity required by the schools were expected at 5 units and 10 units shows that the price of the bottles decrease as the small schools increases the quantity from 5 to 10 units daily and the delivery charge remains the same and no changes in the delivery charges.

Analysis of Medium School

Table 5.3

Cost of Packaged Water for 20 Unit

Quantity	Stats	Charges in ₹	Uptp_3Km	Upto_10Km	Upto_20Km
	Mean	23.64	36.36	104.55	222.73
	N	11	11	11	11
20	Std. Deviation	2.54	50.45	15.07	51.79
	Minimum	20	0	100	150
	Maximum	30	100	150	300

Source: Computed by the researcher through primary data collection

Above Table 5.3 shows the cost of 20 bottles at ₹ 23.64 where the maximum and minimum price offered was ₹ 30 and ₹ 20 from the suppliers. The cost of delivery of 20 units of bottles within 3 kms cost ₹ 36.36. The cost of delivery charges within 10 kms was priced at ₹ 104.55 and within 20 kms was ₹ 222.73 .

Table 5.4

Cost of Packaged Water for 40 Unit

Quantity	Stats	Charges in ₹	Uptp_3km	Upto_10km	Upto_20km
	Mean	22.64	.00	.00	.00
	N	11	11	11	11
40	Std. Deviation	3.11	.000	.000	.000
	Minimum	20	0	0	0
	Maximum	30	0	0	0

Source: Computed by the researcher through primary data collection

The Table 5.4 gives the information on the cost of 40 units of bottles are prices at ₹ 22.64 with maximum price of ₹ 30 and minimum price of ₹ 20. The cost on delivery charges within 3 kms, 10 kms and 20 kms there was zero (0)charges. The delivery of the 40 units of bottled water is not costing any delivery charges.

Consequently, the cost of packaged water is reducing as the quantity increases from 20 units to 40 units. It was found that the delivery charges are not levied on the delivery of 40 units of bottled water. The supplier is ready to bear the cost of delivery in case of more quantity.

Analysis of Large Schools

Table 5.5

Cost of Packaged Water for 80 Unit

Quantity	Stats	Charges in ₹	Uptp_3kms	Upto_10kms	Upto_20kms
	Mean	21.91	.00	.00	.00
	N	11	11	11	11
80	Std. Deviation	3.21	.00	.00	.00
	Minimum	19	0	0	0
	Maximum	30	0	0	0

Source: Authors compilation from the data collection

Table 5.5 gives the information on the cost of 80 units of bottles which is priced at RS 21.91 with maximum price quoted ₹ 30 and minimum ₹ 19. The delivery price of 80 bottles within the 3 kms, 10 kms and 20 kms was zero (0).

Table 5.6

Cost of Packaged Water for 100 Unit

Quantity	Stats	Charges in ₹	Uptp_3kms	Upto_10kms	Upto_20kms
	Mean	21.82	.00	.00	.00
	N	11	11	11	11
100	Std. Deviation	3.219	.000	.000	.000
	Minimum	19	0	0	0
	Maximum	30	0	0	0

Source: Authors compilation from the data collection

Table 5.6 shows the cost of 100 units of bottle at ₹ 21.82 with maximum quote of ₹ 30 and minimum quote of 19 received from the suppliers. The delivery cost of supplying the 100 units of bottles within 3 kms , 10 kms, and 20 kms was zero (0).

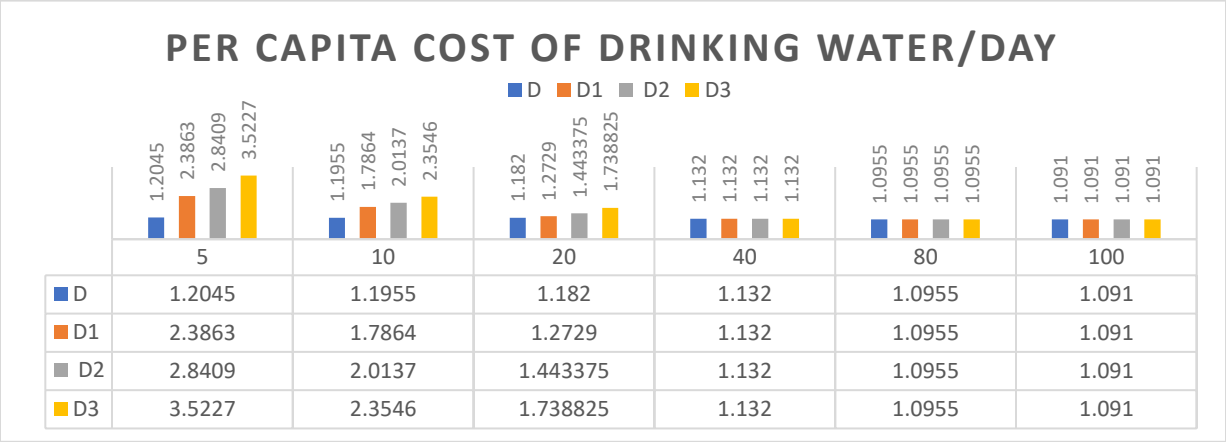
Thus, It was found that prices of 80 units and 100 units of bottles were almost same and found that the delivery charges were not levied and kept free delivery due bulk quantity.

5.5 PER CAPITA COST OF DRINKING WATER PER DAY

The Fig 1 gives the information on the cost per day per student for bottled water. The schools procuring 5 units bottles for 100 students (1liter per student)[i] daily then the percapita cost is estimated around ₹ 1.2045.

Figure 5.1

Per Capita Cost of Drinking Water Per Day



	5	10	20	40	80	100
D	1.2045	1.1955	1.182	1.132	1.0955	1.091
D1	2.3863	1.7864	1.2729	1.132	1.0955	1.091
D2	2.8409	2.0137	1.443375	1.132	1.0955	1.091
D3	3.5227	2.3546	1.738825	1.132	1.0955	1.091

Source: Authors compilation from the data collection

Notes;

D; charges without delivery cost

D1; charges with delivery cost within 3kms

D2; charges with delivery cost within 10kms

D3; charges with delivery cost within 20kms

The per capita cost per day (PCCD) per student is ₹ 2.39 with delivery charges within 3 kms. The PCC per student with delivery charges within 10kms and 20kms are ₹ 2.84 and ₹ 3.52 respectively.

For the 10 units of bottles PCCD is ₹ 1.20 approx. and with delivery charges within 3kms it is ₹ 1.79. The PCCD for delivery within 10kms and 20kms are ₹ 2.01 and ₹ 2.35 respectively for the small schools.

For the medium schools with 20 units of bottles PCCD is ₹ 1.18 and with delivery charges within 3kms is ₹ 1.27. The PCCD of 20 units within 10 kms and 20 kms are ₹ 1.44 and ₹ 1.73 respectively.

Schools procuring 40 units of bottles the PCCD is ₹ 1.13 and within 3kms, 10kms and 20kms the price remain the same and the cost of delivery is zero due to the advantage of bulk quantity.

In case of large schools for 80 units of bottles cost ₹ 1.1 approx PCCD and delivery charges within 3kms, 10kms and 20kms there is not delivery cost charged.

Simillarly for 100 units of bottles are free from delivery charges within 3kms, 10kms, and 20kms and the price comes to ₹ 1.1 approx.

Secondary Objective -4 *To identify the role of the private sector in supplying drinking water in the selected educational buildings.*

Findings

- The PCCD per student for all the quantities of the bottles ranges between ₹ 1.21 approx and ₹ 1.10 without including delivery cost and found the difference of 0.10 paise
- The delivery cost within 3kms, 10kms and 20kms for smaller quantities are significant and will cost more for procuring 5 units to 20 units of bottles.
- [ii]The delivery cost within 3kms, 10kms and 20kms for larger quantities are significant and no cost for procuring 40 units to 100 units of bottles

The findings of the chapter shows that the role of private sector in supplying packaged drinking water can play a vital role for providing safe drinking water to its stakeholders. The prices of the packaged drinking water which was obtained from the local water suppliers gives the information about PCCD per student. The PPP (Public Private Partnership) model can be devloped for the supply of RO Water in the schools which will standeredise the drinking water infrastructure of the school.

Work Cited:

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[i] *Daily 3.2 liters for a whole day (2.7+3.7=6.4/2=3.2) liters water consumption for men and women. For students of the schools the researcher has set the average limit of 1liter perday in school.