CHAPTER-6

SUGGESTIONS, CONCLUSION AND RECOMMENDATION

Water resources of the country are one of the important assets. India is currently facing a formidable set of water-related challenges. Increasing population, increasing urbanization and rapid industrialization combined with the need to increase agricultural production, all these generate competing claims for water. Therefore, in this context it becomes important to explore the various aspects of water in general and drinking water in particular for school children. Detailed analysis from the last two chapters discussed the drinking water infrastructure of selected schools of Vadodara city in which the researcher identified the fixed and variable factors of DW infrastructure, and followed it to perform the cost analysis in the first section of Chapter-4 which is concluded in the form of following finds:

Primary Objective 1: To identify the Drinking water infrastructure in the selected educational buildings of Vadodara City of Gujarat state.

Fixed Factors of Drinking water infrastructure

Water Tanks

- RCC water tanks were used as storage of drinking water, which was very old with high chances of contamination, providing unsafe for drinking without use of RO filtration.

Taps

- It was found that the taps are not sustainable for a longer period of time and regular replacement and complain of leakages were reported.

Purifier

- Some of the schools with water purifiers were not found good from the observations (annexure 5) and monitoring and maintenance problems were observed.

Water cooler

- Cooler used by 55 percent of the selected school showed that water cooler is optional and not compulsory part of the drinking water infrastructure.

Variable Factors of Drinking Water Infrastructure

Labour

- The size of the water tank and labour used to clean it are not dependent. So, the labour used to clean can be standardized. Labour was required half yearly to clean water tank which implies that it only costs nominal amount.

Purifier Filter

- For the safe drinking water purifiers need to be timely checked for change of filters to maintain the quality of water and sustainability of RO purifier. The replacement of the purifier filters was done quarterly which makes the quality of water questionable.

Electricity

- The RO system and Water cooler have significant usage of electricity while electricity used for water motor was very less.

Bleaching powder (cleaning purpose)

- The frequency of cleaning the tank was found average half yearly which can be the one of the reasons for seeing bleaching powder as so significant part of drinking water infrastructure. The only known source for cleaning ~~was~~ found was “Bleaching powder” as washing agent for water tanks.

Secondary Objective 1: To identify the dependence of educational institute on municipal supply or private supply of drinking water

Finding

- It was found that schools are not dependent on VMC for daily water requirement. Schools have some alternative source of water to meet the daily water needs. Bore motors were observed as the other source of water supply, which directly extract the water from the ground.

Secondary Objective 2: To identify the educational institution lacking drinking water infrastructure factors.

Finding

- The descriptive analysis of data and the feedbacks of the principals are obtained on their minimum requirement towards the demand for drinking water. The empirical study found that schools are lacking with RO water purifier in the schools, and water cooler.

Secondary Objective 3: To compare the drinking water infrastructure at selected public owned and private owned educational buildings.

Result:

- Results of the Hypotheses showed that Drinking water infrastructure of Private schools is found to be surpassing that of the Government schools.

Primary Objective 2: To identify the drinking water infrastructure operational & maintenance of cost.

Finding

- The operational cost of the drinking water consists of labour cost, cost of fillers, cost of taps, cost of electricity, bleaching powder cost and water Tax are identified as operational and maintenance cost.

This was followed by section two in which school going students and teachers were interviewed on various parameters of drinking water facilities in their respective schools and chapter 5 analyzed the cost of packaged RO water for schools.

- The prices of the packaged drinking water which was obtained from the local water suppliers give the information about PCCD per student. 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 private public partnership in the packaged drinking water found promising avenue for the stakeholders.

In the background of the above findings of the chapter-4 and chapter-5, the researcher makes the following conclusion, suggestions, and recommendations.

6.1 SUGGESTIONS

For Government to be considered for implementation:

- Drinking water and wash water should be given separate connection.
- Rebate on water tax should be given to the schools having water harvesting that helps in ground water recharge.
- Financial support for the development of drinking water infrastructure should be given for RO system and water coolers.

- Audit of water infrastructure to monitor the adequate and safe drinking water facility are maintained by the school.
- There should be prohibition on the ground water extraction without water meters, to keep a check on ground water depletion.
- Handpumps should be banned due to high cases of contamination found with handpump water across the country not only it will help in saving the ground water but also keep the people away from health hazard; specially used and seen in rural schools where it is used as source of drinking water. If the handpumps are inevitable source of water supply, then there should be regular monitoring and testing of the quality of the water should be done on regular interval.
- Minimum standard for drinking water infrastructure for all school are suggested by the researcher to set the bottom line of the water infrastructure.
- Drinking water supply by VMC should not be used for other purpose as found by the researcher, used for wash purpose, as the cost of water purification, cost of water collection and cost of water distribution incurred by VMC and not free (someone has to bear the burden). The opportunity cost of the water becomes very high and can be reduced to minimum.
- Water meters at schools should be installed to check the water usage. The objective of installing water meter would keep the usage of water in efficient use, check the quantity of water used by the individual schools, measure the water inequality in consumption, helps in providing incentives and penalties for the water usage.
- It is suggested that separate water meter connection for drinking water which is supplied by VMC and the water meter for bore connection to check the ground water extraction of the water by the user. The VMC supplied water should not be used for the Wash purpose as its drinking water. The ground water should be used for Wash purpose in the schools. to save the cost of drinking water incurred by VMC and lots of drinking water can be saved and supplied to other areas with low supply.
- Schools with water harvesting system fitted with water meter should be given capital incentive for developing water harvesting infrastructure and rebate on water tax for yearly recharge of ground water. Like the solar panel subsidy on capital investment and credit of units for electricity can be used for the reference model.

For Schools

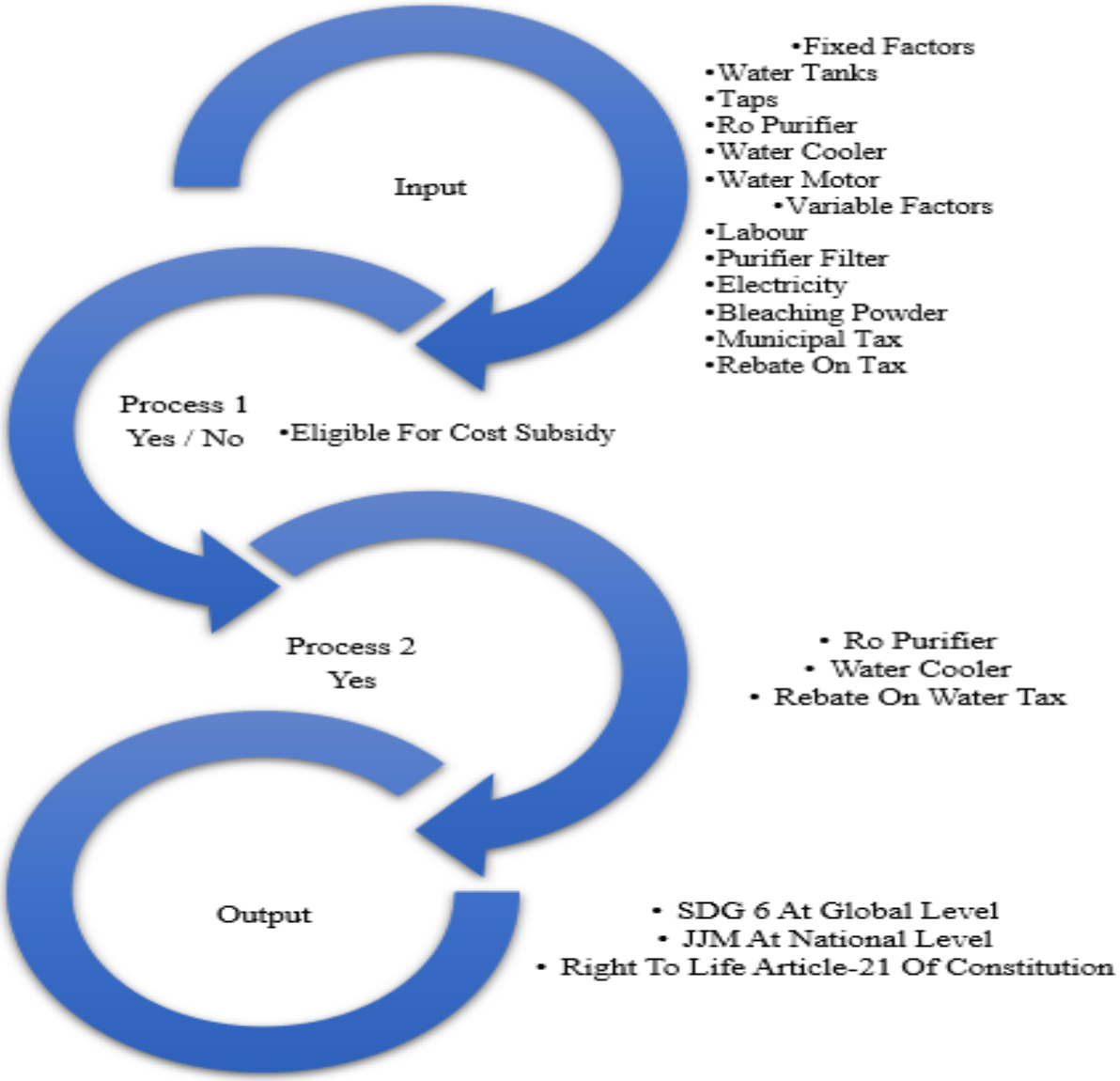
- Dedicated financial provisioning to support the drinking water infrastructure and regular monitoring. As there is already existing financial Aid ~~is~~ available for drinking water facilities but no mention of drinking water infrastructure.
- Like the fire safety measure in the schools there should be drinking water safety measures.
- Study suggests the school infrastructure should be equipped with water purifier as a minimum requirement for drinking water infrastructure.
- Study suggests the schools for installing RO plants with large size of the school and water purifier for small and medium size of the schools. The size of the school is in terms of the total strength of the schools consist of number of students, teaching staff and non-teaching staff.
- Separate financial provisioning for the maintenance of drinking water infrastructure. It was observed and revealed during the informal discussion that the cost only approved and allocated when there are damages to the water infrastructure.
- The study suggests the proactive approach in maintenance of water infrastructure, prevention is better than curative measure.
- Some of the variable costs are nominal and schools can take the responsibility of it and have budget provision for the same as, electricity used for RO, water Cooler, Filters of the RO, Annual Maintenance cost of labour for cleaning of the tanks.
- A dedicated maintenance of Rs. 10,000 annual cost is suggested for the plumbing and repair work related to leakage of taps, tanks, and pipes.
- Schools are suggested to invest in the water harvesting infrastructure to protect the future water scarcity and ground water recharge. This will be realistic, idealistic, and holistic approach of water education in school to students and teachers.

6.1.1 Suggested Model- Cost-Subsidization for Drinking Water Infrastructure

The cost subsidization model is framed on the basis of the research findings used as Input Variable and those variables were processed by the eliminating the variable for consideration of cost subsidization and giving the final outcome on the variables to receive subsidy.

Figure 6.1

Cost Subsidization Model for Drinking Water Infrastructure



INPUT VARIABLE

Following are the input variables of the research study on drinking water infrastructure used as fixed and variable factors. Fixed factors consist of water tank, water taps, RO purifiers, water cooler, and water motor. Variable factors consist of labour, purifiers filter cost, electricity cost, bleaching powder cost and Municipality tax.

PROCESS-1

Under the process step the variables are selected are selected and rejected for considered for the subsidy is justified as Yes / No.

During the process of elimination some fixed factor and some variable factors are eliminated from the cost subsidization and not consider for the subsidy.

- Water tanks are not considered for subsidy because it's the mandatory requirement for every school to setup schools water tank. The cost of water tanks must be borne by the management while establishing the entire building and one of the mandatory parts of it. It was also found while observation and the survey that the drinking water tanks was available in every school and was sufficient.
- Taps are classified as operational and maintenance cost that's the reason it should not be considered for subsidy.
- RO purifier **is** classified as fixed cost of drinking water infrastructure and it ensure the safety and security of the drinking water. It was also found that there were many schools that were not having RO purifiers in the schools. **So,** the RO purifiers are considered for subsidization.
- Water coolers are used to enhance the quality of water but considered as optional. water coolers are classified as fixed factor but not compulsory and used as optional by the management. From the government point of view, government want to subsidize those cost which ensure the safety and security of drinking water. But the water cooler used for cooling purpose. Management can enhance the quality of water by using coolers at their expenditure and no subsidization is recommended but kept as optional because it helps in increasing the water intake and maintain the water level of the body and keeps body healthy (see chapter-4, water cooler)

- Water motor is also a fixed cost and replaced almost in 8 to 9 years. These types of cost are borne by the management itself. No cost subsidization is recommended for it.
- All the variable factors are not considered for the subsidy as the subsidy is available for the expenditure on capital goods, but the VMC water tax was considered for subsidization as Tax Rebate. As the rebate on tax will help in ensuring the suitability of drinking water infrastructure, which makes eligible for subsidization.

PROCESS 2

In the process 2 of the model suggest that three factors are suggested for cost subsidization, RO purifier, water cooler (optional) and the VMC tax.

- RO purifier ensures the 99% safety which is very important to for school going students. So, it is suggested to provide subsidy on it.
- Water coolers are optional as it can be subsidized by the government or not entirely depend on the discretion of the government, as the water cooler are water cooler enhance the quality of water by cooling it. Cool water is more preferable and drinkable water compared to normal water specially among the children.
- VMC tax Rebate can be used to sustain the schools water infrastructure. This can be possible if the VMC tax rate offers rebate on the tax, everybody will try to save and get incentive in the form of rebate. Rebate can be received every year by keeping the ground water recharge using water harvesting system in the schools. This will promote the water conservation and save a lot of water.

How much subsidy is expected to be spent?

The cost of subsidy to the government or other sponsors or NGO' or Corporates gives the expected minimum and maximum cost based on the analysis of the cost of the drinking water parameters in the chapter 4. The following minimum and maximum cost is suggested based on the type.

Cost subsidization of RO purifier

- The RO purifier with minimum capacity used 50 LPH to Maximum 200 LPH category would only cost minimum ₹ 10000 and maximum ₹ 22000.

- The cost will also increase if the number of purifiers increases. In such cases the government can provide the cost subsidy to the schools as 100 percent, 80 percent, 60 percent, or 40 percent to support the drinking water infrastructure.

VMC Tax and Rebate

- The government can give concession on the yearly water tax as a rebate. Rebate should be given as an economic incentive to maintain and keep drinking water infrastructure in good condition. Special attention can be given towards the water conservation by having water harvesting in every schools. This will help in recharging ground water and sustainable Practice.

Water Cooler

- The water cooler is optional and at the discretion of the government. For which the minimum cost is ₹ 15000 for 50 liters capacity and maximum cost is ₹ 70000 for 200 liters capacity.

OUTPUT

- WHO and UNICEF is working towards providing safe drinking water to all, under the umbrella of SDG-6. The cost subsidization model towards the drinking water infrastructure support and advocates in favour of safe drinking water to school going children. Thus, this model helps in attaining the objective of Joint Monitoring Program by WHO and UNICEF
- Under the umbrella of JJM, safe water promises to everyone can be attained by the cost subsidization model.
- Under the duties of the state government as per the Article-21 of the constitution the safe water to children is advocated by this model.

6.2 CONCLUSION

It is clear that due to scarcity of water to meet the requirement of growing population, significant attention is being paid to water resources with rapid economic growth of population and industrial development, the pressure on water resources is increasing and mismanagement of water is further adding to the water problem. The World Health Organization, UNICEF, UN Water and other national agencies are increasingly taking action to reduce countries' water issues and develop programs and action plans to deal with current and future problems. The Government of India under the Ministry of Jal Shakti has accelerated action towards the SDGs set by UNICEF and WHO under the Joint Monitoring Program. Ministry of Jal Shakti has launched Jal Jeevan Mission and Swachh Bharat Mission to tackle water issues in India at national level for inclusive growth with significant achievements. However, the achievement has still not reached 100 percent and continuous and sustainable action plans are needed at the lower level (micro level).

There are many purposes and uses of water resource such as agricultural purpose, industrial purpose and for service sector but "drinking water" purpose does not need explanation especially why it needs attention?

The present research has been done towards SDG6, JJM and Right to Water under Article-21 of the Constitution with the objective of providing safe drinking water to school going children on drinking water infrastructure and its economic aspect.

The increasing water pollution and water mismanagement are serious issues in the present and future, which should be addressed by strong action by the government where economic incentives can play an important role. The conclusion of the research is that safe drinking water should be made available to school going students by improving the drinking water infrastructure and the fixed cost of the infrastructure should be borne by the government as suggested in the 6.2 section. Standard policy for school drinking water infrastructure like the policy made by the government for fire safety and mid-day meal programme.

6.3 RECOMMENDATIONS

Based on the findings of the research study of selected schools of Vadodara city, the researcher has given suggestions for the government and school management. Based on suggestions, the researcher has proposed the following recommendations for the schools.

For Government

- Purifier System Mandatory for all Schools

  Water purifier systems should be made mandatory for all schools to ensure safe drinking water to students and teachers. The principals of the schools suggested during the survey that the government should provide RO systems for those schools which do not charge more fee from the students.

- Regular Monitoring and audit of Drinking Water Infrastructure

  Sustainable drinking water infrastructure should require regular inspection of drinking water infrastructure. As observed, the condition of drinking water was found to be in very poor condition due to lack of monitoring and proper inspection. (Annexure 5)

- Compulsory water audit of Drinking water Parameters (See chapter-4 in Section-II) in the study

  It was found that students and teachers had different opinion about the parameters of drinking water, and it was also observed that there were separate drinking water arrangements for teachers and students during field visits. The students gave an "average" opinion about the drinking water parameters of the drinking water in their schools.

- Cost Subsidization for Drinking water infrastructure

  Economic incentives help in promoting action towards safe drinking water by providing subsidy for installation of RO water purifiers.

- Tax rebate for water harvesting

  The schools have large infrastructure which can be used during the monsoon to help conserve water and recharge groundwater. This will be a small step towards water conservation for own use and maintaining the water resource. Tax exemption (Tax Rebate on Municipal tax) can act as an incentive to start water harvesting system in the school premises.

- Water Meter

Water meters should be installed by the schools to check water consumption so that water limits can be set, and water inequity and inefficient use of water can be controlled through higher pricing and penalties.

6.3.1 Recommendations for Future Research

1. To find out the knowledge/awareness about water, safe drinking water, a survey can be conducted in schools in other cities.
2. A study of similar nature may be conducted to know the constraints faced by the school management and their opinion regarding drinking water facilities.
3. Studies of similar nature can be used for cross-sectional analysis
4. A study can be conducted to find out the incentives and policies formulated by the government to promote efficient use of water and its awareness among the public.
5. A study can be conducted to know the opinion of the public towards drinking water.
6. Case studies can be used to assess the performance of robust drinking water infrastructure in cities.
7. Study can be done for water harvesting project in schools
8. A similar comparative study can be done between different cities of Gujarat state and other states of India.
9. A similar nature study can be done in commercial buildings.
10. Study can be done on Public Private Partnership project.