

Water refilling station: an alternative source of drinking water supply in the Philippines

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Due to management problems in water utilities coupled by poor environmental conditions and occurrence of cholera outbreaks in some areas of the Philippines, a portion of the population have shifted their preference to alternative sources of drinking water. The demand at the water refilling stations - water stores that sell purified water – is now increasing. The quality of purified water conforms with the national standards for drinking water and is even better than the quality of water produced by traditional water supply systems in terms of removed impurities. To ensure water safety and prevent waterborne diseases, the government is regulating the operation of water refilling stations. Critical components are required to comply with sanitation standards and should be adequately monitored. These include the water source, the building, the water purification system, the personnel and the handling of product water.

Introduction

The Philippines with a population of 83.4 million (2004 estimates) is endowed with rich natural resources including water. Its total water resource potential is about 145,990 million cubic metres per year which is essential to the country's economic development and in the achievement of its millennium development goals (MDG). Its traditional water supply facilities include piped water systems, communal taps, and point sources. Alternative schemes, such as vended water, bottled water, household use of water purifiers, and water refilling stations are available for population with no access to water supply systems and for the served population with doubts about the water quality of the systems.

To be relevant to the theme of this conference, this paper will highlight the people's preference on water refilling station as an alternative source of drinking water. In the capital region of Metro Manila, water supply coverage is relatively high at 84 percent by year 2000 (World Bank, 2000). However, this status does not exempt the area from having cases of waterborne diseases. A cholera outbreak occurred in 2003 in one of its communities. Health authorities traced the cause of the outbreak to contaminated and illegally connected water pipes. Another water quality problem was the yellow discoloration of the water supply which occurred before the privatization of the Metropolitan Waterworks and Sewerage System. This experience affected the confidence of the consumers in using the water for drinking purposes. In the search for better water quality, they therefore tried other options such as the use of household water purifiers, resorting to bottled water and patronizing water refilling stations. These practices can be observed also in other urban centres of the country.

Over the years, as the demand for cleaner water becomes

higher, the price of household water purifiers and bottled water has become prohibitive. Water refilling stations managed by private entrepreneurs offer a cheaper and more convenient solution to the public's drinking water needs than bottled water or the use of household filters. At present, about 3,000 water refilling stations have proliferated nationwide. They sell purified water of comparable quality with bottled water at a lower price. For example, the current price per gallon of refilled purified water in Metro Manila ranges from P 50 to P 120 per 5-gallon container or about P 2.50 to P 6.00 per liter while the bottled water is sold at P 12.00 to P 25.00 per liter. Household filters, on the other hand, cost P 5,000 to P 25,000 per unit (1 US \$ = P 56 in 2004).

For people in Metro Manila who are not using these alternative sources, their option for drinking water is the piped water supply at a much cheaper rate of P 14.22 per cubic metre and vended water at P 0.08 to P 0.10 per litre (Table 1).

Table 1. Cost/litre of water supply types, Metro Manila, 2004

Type of Water	Unit Cost (in PhP)	Cost/Litre (in PhP)
Purified Water	50.00-120.00 per 5 gallon	2.50-6.00
Bottled Water	12.00 – 25.00 per litre	12.00 – 25.00
Piped Water	14.22 per cubic metre	0.01
Vended Water	80-95 per cubic metre	0.08 – 0.10

In Metro Manila, most of the water refilling stations are connected to the pipes of two concessionaires: Maynilad Water Company or Manila Water Company for their source of raw water while in other areas they opt to use private deep wells. The ‘potable water’ supplied by the providers is then further purified by utilizing a combination of water treatment equipment, such as sediment filters, carbon filters, water softeners, reverse osmosis membranes, ultra-violet lamps, and ozone generators. Typical water refilling stations can produce 3,000 to 12,000 litres of purified water per day.

In previous years, most of the people were bringing a container to a water refilling station to buy purified water. Nowadays, because of convenience on the part of the consumers, purified water in 5-gallon (22.7 litres) containers are delivered by the station directly to the people’s home. Aqua Sure, a water refilling station in Metro Manila, can deliver 5,500 gallons (25,000 litres) a day to its 8,000 household clients.

Features of a water refilling station

Structurally, water refilling station can be operated with a minimum area of at least 20-25 square metres. It comprises the following sections: refilling and selling room, enclosed water purification room, container washing and sanitizing room, storage room for empty and refilled containers, source water storage facility, toilet and an office. To operate the water store, about five employees are needed (Table 2).

Table 2. Typical human resource requirement of a water refilling station

No.	Employee	Functions
1	Manager	Oversees store operations at least 4 hours a day.
1	Accountant/Bookkeeper	Makes financial statement of business operations
1	Administrative Assistant	Logs and handles cash sales and purchases
1	Front liner	Accepts and refills containers of customers
1	Technical Assistant	Maintains and runs the machines
1	Driver/Delivery man	Transports refilled containers to customer’s home

The main processes in a water refilling station is dictated by raw water quality. The typical steps are filtration (several stages), softening, and disinfection. The machines that could be installed for such processes are the following:

- Multi-media sediment filter - removes sediments such as rust, sand and particles that are invisible to the naked eye; employs a total of 5 filters

- Ion exchanger - replaces hard minerals with soft minerals
 - Activated carbon filter - removes all organic chemicals, herbicide, pesticide, offensive odor and bad taste
 - Reverse osmosis membrane - the heart of the system and the most expensive unit; removes inorganic minerals, bacteria and viruses while retaining its oxygen content. Since the filter size is very small at less than 0.05 micrometre, the product water could have a total dissolved solids (TDS) of less than 10 ppm. The filtration process rejects about 50 percent of raw water volume.
 - Post-carbon filter - improves the taste of water.
 - Ultraviolet lamp - ensures that the water is free from disease-causing microorganisms.
 - Ozone generator – inhibits the growth of bacteria in the product tank and prolongs the shelf life of water
- The efficiency of water purification system in removing impurities is high. The 10 water quality parameters measured by Magtibay (2001) showed an average of 80 percent efficiency.

Institutions and policies

The agencies directly involved in the establishment and operation of water refilling stations are as follows:

- The Department of Health (DOH). DOH is the main agency responsible for protecting the health of the people. The Sanitation Code of the Philippines mandates DOH in protecting drinking water quality. Consequently, DOH issues implementing rules and regulations prescribing sanitary standards for water supply systems, including water refilling stations.
- The Center for Health Development (CHD) is the regional branch of DOH. Its main function is to provide technical assistance to local government units and to monitor DOH programme implementation which includes water quality and sanitation standards. For water refilling stations, CHD is mandated to issue initial and operational permits.
- The Local Government Units (LGUs) are mandated by Presidential Decree (PD 856) to issue sanitary permit, sanitary clearance, health certificates, certificate of potability, drinking water site clearance and closure order (if necessary) and to conduct sanitary inspection of WRS.
- The Water Quality Association of the Philippines Inc. (WQAP) is an organization of private firms who are engaged in the manufacture, sale, and distribution of water refilling station equipment and supplies, as well as water treatment and purification equipment and technology for household, institutional, commercial and industrial applications. The principal objective of the WQAP is to professionalize the water refilling business by conducting seminars, lectures, and symposia on water

treatment, DOH policies, and related subjects. The group also monitors implementation of its code of ethics and truth-in-advertising rules to protect consumers. About 85 percent of its 250 members operates water refilling stations.

- Association of Water Refilling Entrepreneurs (AWARE) concentrates on resolving business management issues of its members.

Presidential Decree No. 856 (PD 856) or the Sanitation Code of the Philippines is the main law requiring all establishments to comply with existing sanitary standards to protect public health. Guidelines for operating a water refilling station are indicated in the Supplemental Implementing Rules and Regulations on Water Supply of PD 856 issued in 1999. This guideline stipulates control over the water source, the building, the water purification system, the personnel and product water handling. Amongst other things it requires:

- The water source shall be subject to a sanitary survey to be conducted by the municipal or city health office before a drinking water site clearance will be issued by the municipal or city mayor. The sanitary survey evaluates the environment of the proposed water source to determine any potential source of pollution.
- Before the water refilling station operates, its building must possess a sanitary permit. The sanitary permit is the written permission issued by the local health officer certifying that the establishment complies with the existing minimum sanitation requirements of PD 856 and its implementing rules and regulations.
- The water purification system should be installed in accordance with approved design. The equipment should have DOH certification and be replaced regularly as per manufacturer's requirements. A by-pass connection in the purification processes is not allowed. The system should be efficient at removing any residual of the water disinfectant in the product water. Equipment maintenance can be conducted either by equipment suppliers or trained technician at the water refilling station.
- The operator or persons directly involved in the management or supervision of WRS shall undergo a 40-hour basic certification course on ecology, hydrology, microbiology and parasitology, water demand and treatment, sanitary chemistry, plumbing, public health engineering, hazard analysis critical control point, and environmental laws. This training is conducted by the Department or any DOH-accredited professional organization or institution. Other employees in the establishment shall attend a 20-hour long water sanitation classes to be conducted by the local health office as a pre-requisite for the issuance

of the health certificate. No person shall be employed without an up-to-date health certificate issued by the local health officer. A health certificate is a written certification issued after the person has passed the required physical and medical examinations and is immunized (if required).

- Product water handling is governed by various check-points. Containers should have DOH certification. Sanitizing solutions must be approved by DOH. Filling and capping of water containers must be done in a sanitary manner. To ensure safety in transporting product water, a delivery vehicle should have an updated sanitary clearance issued by the local health office. If one of these points is neglected, contaminants may find their way into the product water. Another possible risk of contamination is the lack of instructions given by the water refilling stations to consumers on how to keep delivered water safe at home.

Water quality monitoring

Source water and product water are subject to regular monitoring by the local health office. The national standards for drinking water contains 54 parameters that must be complied with. Only DOH-accredited laboratories are allowed to conduct water testing and analysis. The frequency of monitoring is as follows:

- Bacteriological quality - at least monthly
- Physical quality - at least every six (6) months
- Chemical quality - at least every six (6) months
- Biological quality - at least once a year
- Monitoring of radioactive contaminants shall be done only if there is significant input of radiation from the surrounding environment.

Conclusions

Water refilling stations can be a good source of safe drinking water in the Philippines. Purified water can meet the aesthetic standards easily detectable by the people in terms of taste, odor and color. The efficient water purification processes can make the quality of water superior to the traditional water systems. However, the risk of contamination is possible if the handling practices are not closely monitored.

To ensure the production of safe water in water refilling stations and avoid waterborne diseases, the following aspects all have to be in place: compliance of operators to all sanitary requirements of PD 856; capability of water laboratories to conduct complete and accurate water testing and analysis; proper operation and maintenance of water purification equipment; skills of local health office to conduct sanitary surveys and water quality monitoring; a programme for water source protection; and a vigorous information campaign on how to keep delivered water safe at home.

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