COURSE: POST GRADUATE DIPLOMA IN WASH

ASSIGNMENT: No 4

ONLINE STUDIES, NETHERLANDS STRATEGIE

ADMISSION NUMBER: 340/06/2019

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SUBMISSION DATE: 30th .Nov.2019

SUPERVISED BY: COURSE MODERATOR

Assignment

1. List and briefly describe the measures by which the success or otherwise of a public–private partnership providing water supply services can be assessed.

**Answer**

**Public–private partnerships**

In the major towns and cities of Ethiopia water is supplied by water utilities (also known as Town Water Supply Enterprises) but public–private partnerships(PPPs) can be helpful. A public–private partnership is any collaboration between public bodies, such as a municipality or even the government, and private companies. The belief is that private companies are more efficient and better run than bureaucratic public bodies, and the management skills and financial acumen that they bring will create better value for money for customers. The incentive for the private companies is the profit that can be generated. PPPs have become popular, to the extent that the number of people served by private water operators in developing and former Communist countries increased from 94 million in 2000 to more than 160 million in 2007 (Marin, 2009). Philippe Marin’s report, Public–Private Partnerships for Urban Water Utilities, which was a review of PPPs in urban water utilities in developing countries, was undertaken because of the interest generated in these arrangements. At the time of the report (2009), about 7% of the urban population in the developing world was served by private water operators. There are different ways in which PPPs can be set up (described later in this

**Access**

Marin found that where most of the investment for expansion of access was provided by the public partner rather than the private operator, access to piped water increased. The finance provided by the public partner is thus crucial if the aim is to increase the number of people with access to water.

**Quality of service**

Marin reported that often water PPPs substantially improved service quality, in particular by reducing water rationing (for example, in Guinea, Gabon, Niger and Senegal). This had the advantage of improving drinking water quality because a constant flow of water through the piping system reduces the risk of infiltration of unclean water from the soil around the pipelines.

**Operational efficiency**

The three main indicators of operational efficiency (water losses through leakage, etc., payment collection and labour productivity) were also studied by Marin.

**Water losses**

Any water lost is a loss in income, and so, perhaps predictably, Marin found (in line with other researchers) that private operators were effective in reducing water losses, some reducing non-revenue water to less than 15% (which Marin states is similar to that of some of the best-performing water utilities in more developed countries).

**Payment collection**

Not surprisingly, because of the financial benefits to the private partner, it was found that the introduction of a private operator markedly improved the payment collection rate.

**Labour productivity**

There was strong evidence that the introduction of private operators resulted in an improvement in labour productivity. This is the amount of work undertaken by each employee. Many of the public water utilities studied were over-staffed, and the PPPs when set up were followed by significant redundancies, ranging from 20% to 65% of the labour force. Besides the over-staffing issue, layoffs were often motivated by a need to change the overall profile of the workforce and to hire more skilled people (Marin, 2009).

Marin concludes by saying that the biggest contribution that private operators can make in a PPP is in improving operational efficiency and service quality. Improving service quality results in customers becoming more willing to pay their bills, and increasing operational efficiency results in increased income. Both of these factors lead to more money being available for investment in expansion of services. In turn, expansion of services results in more customers and consequently increased income, which again can be invested to bring access to water to even more people.

The performance of a PPP (and indeed a public water utility) can be assessed through the following parameters (Athena Infonomics, 2012):

1. **Accessibility:** the extent of coverage of the population, and the distance to the water point.
2. **Affordability:** the cost of the water needed should be less than 5% of the household’s income.
3. **Cost recovery:** the cost of providing the water should be claimed back from the population.
4. **Minimisation of non-revenue water:** this should be reduced to 15% or less.
5. **Water quality:** the water should meet national standards for quality.
6. **Operational efficiency:** the quantity of water supplied per capita, and the duration of water supply per day.

These parameters can be used to evaluate whether a PPP is beneficial, with data from before the partnership’s creation being compared with data after the PPP has been running for, say, a year.

2. Give six possible causes of water emergencies, three due to natural causes and three due to humans.

**Answer**

**a. Three possible natural causes of water emergencies are:**

**Drought**:droughtoccurs when there is a deficiency in precipitation over an extended period of time, resulting in a water shortage. You are probably familiar with the consequences of a drought. The lack of rain means that the water flow in rivers is reduced, lakes and pools shrink in size or may dry up, groundwater and soil moisture are depleted, and crops are damaged. Prolonged drought can lead to a major national and regional food insecurity crisis. Domestic animals might also die.

**Flooding:** Is an abnormal rise in the water level and may result in overflowing of streams or rivers. Flood waters can destroy infrastructure, including houses, roads and water supply systems, as well as agricultural crops, which ultimately causes a shortage of food supplies in the country. Besides the destruction of property, people and animals may be killed, especially when flash floodsoccur. (A flash flood happens when rain falls so fast that the underlying ground cannot drain the water away fast enough and rivers overflow their banks. Roads can then become like rivers and if there is a lot of water it can flood buildings and carry cars away.)

Floods can cause widespread bacterial contamination of wells and surface water sources with faecal matter washed from the ground surface or from flooded latrines and sewers, resulting in the outbreak of disease. For example, cholera commonly occurs

**Earthquakes:**

An earthquake can cause serious damage to infrastructure on and in the ground. Pipes and treatment plants will be destroyed by a high-magnitude earthquake and the communication systems (such as road and rail networks) often become non-functional, making the delivery of emergency water supplies difficult. Destruction during an earthquake can also cause chemical spillage at manufacturing plants and warehouses, which can lead to widespread chemical contamination of drinking water.

1. **Three possible causes of water emergencies due to humans are:**

* Accidental contamination of the water supply: Wastes containing chemicals from the town were dumped at the water source of the lake in indiscriminate and irresponsible ways.
* Microbial contamination of water sources due to human mismanagement (such as the cholera outbreak. The suspected source of the epidemic was the contaminated source), with which most of those who had caught the disease had been in contact. The river water was used for washing, bathing, drinking, irrigation and recreation. This came under suspicion as the source of the contamination of the river due to sewage from the base entering the river.
* Deliberate poisoning of the water supply as an act of terrorism: it is possible that a deliberate attempt could be made to poison a water supply as an act of terrorism, but it is far more likely that human causes of water emergencies will be due to accident and neglect. There can be instances where the water supplied will be unfit for human consumption as a result of an accident

b. What are the options for safe water supply during a water emergency?

The possible options for safe water supply during a water emergency are:

* Delivery of water to consumers by water tanker and/or bottles
* The main options for treatment steps needed in household water treatment during a water emergency are filtration and disinfection using chlorine or solar radiation and boiling process

3. You are about to set off to conduct a sanitary inspection of an abstraction point at a river.

1. What would you take with you?
2. Explain four things you will be looking for during your inspection.

**Answer**

1. You would need to take an appropriate checklist of questions to ensure that you inspect thoroughly and don’t forget anything. You will also need a notebook and pen or pencil to record all the information you collect.
2. .Important things to look during the inspections are as follows: Sanitary inspection of an abstraction point at a river, according to (WHO,1997)

* The location of any latrines or other possible sources of contamination (due to farming or industrial activities) relative to the river
* You can inspect whether the source has a good solid fence
* It has a screen on the intake
* The presence of a filter and, if a filter is present, that it is operating properly, and whether there is any uncontrolled flow.

4. Explain briefly why a Water Safety Plan is necessary

**Answer**

If the water quality assessed at the tap where people collect it or use it is found to be poor, it has the disadvantage that unsafe water may already have been consumed by the people served by the distribution system. The WHO has published recommended steps for drawing up a Water Safety Plan (Bartram et al., 2009) on which the following description is based. By using Water Safety Plans, the quality of the water is proactively managed so that poor-quality water does not reach consumers. Water Safety Plans also help to eliminate the causes of incidents that might disrupt the delivery of safe water to consumers.

A Water Safety Plan considers all the stages in the supply of water, and therefore it involves:

* Management of the catchment to prevent contamination of the source water
* Removal or elimination of contaminants during treatment of the water
* Prevention of contamination of the water after treatment (during distribution, storage and handling).

Water Safety Plans put the emphasis on controlling risks where they are likely to arise, rather than having a treatment plant deal with cases of contamination after they have occurred. Preventing a problem from occurring is much better than having it occur and then trying to minimise its impact.

While the primary focus in a Water Safety Plan is on the direct dangers facing safe water quality (such as the possibility of chemical or microbial contamination), the Plan has to be more wide-reaching, considering aspects such as potential for flood damage; the sufficiency of the source water and alternative supplies; availability and reliability of power supplies; the quality of treatment chemicals; the availability of trained staff; security; and the reliability of communication systems.

A Water Safety Plan is necessary to ensure that the water that is produced and delivered to consumers is safe. It also ensures that the chance of an incident disrupting the continuous supply of water is minimized.

5. Distinguish between the two types of maintenance at a water utility and give reasons why one of them is better

**Answer**

**Maintenance** refers to planned technical activities or activities carried out in response to a breakdown, to ensure that assets are functioning effectively, and requires skills, tools and spare parts (Carter, 2009). There are two types of maintenance:

* **Corrective or breakdown maintenance:** this is carried out when components fail and stop working. Breakdown is common in many utilities and occurs as a result of poor preventive maintenance.
* **Preventive maintenance:** this is a regular, planned activity that takes place so that breakdowns are avoided. Examples of preventive maintenance would include servicing of equipment, inspecting equipment for wear and tear and replacing as necessary, cleaning and greasing moving parts of equipment, and replacing items that have a limited lifespan. Preventive maintenance is important because it ensures that the asset fulfils its service life. It also prevents crises occurring and costly repairs (in terms of time and money) being needed. Therefore, Preventive maintenance is better because it helps prevent breakdowns and ensures that the assets can be used until the end of their service life. By undertaking preventive maintenance, crises – which are costly – can be avoided.

Utilities should always ensure that an adequate level of preventive maintenance is in place for all of their assets in the water supply system. This requires that adequately skilled persons are employed as operators or maintenance crew, and that they are provided with the proper tools. A strict and regular schedule of work is also required to ensure that preventive maintenance is carried out at the appropriate time. The next section considers strategies and plans for maintenance.

**Maintenance strategy**

Utilities with a strong focus on the preventive maintenance of assets can save substantial time and costs, avoid service interruptions, and increase their revenue.

A good maintenance strategy will detail:

* How the maintenance activities will be organised (on a regional and area basis)
* How maintenance will be carried out (using own technicians, or outsourcing to skilled technicians outside the utility, or both)
* Clear descriptions of how the assets are expected to function with proper maintenance
* Information and documentation requirements, for example a log of parts replaced, inspections made, recording of any incidents (unexpected events)
* Prioritisation of assets for routine inspection and maintenance (the more important items, such as main pumps, needing more frequent inspection and maintenance)

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