Lesson 2: Costs of Providing Sanitation

2.0 Lesson Overview

»Our operating expenses came down thanks to our cost-reduction efforts.«

(Eric Yu)

Costs of Providing Sanitation

In providing sanitation services, the entities/actors responsible will incur operating costs, capital costs and contingent costs. There is great variability across utilities about the percentages that each of these costs represent in the overall cost structure.

Operating costs: The pollution load – the amount of organic material in the wastewater – is the biggest determinant of treatment costs.

Capital costs: The costs of the collection network itself are driven largely by the length of the network and the levels of groundwater and rainwater inflow and infiltration into the sewer network. Inflows and infiltration determine the required pipe diameters, holding tank capacities, and so on.

Contingent costs: Service providers face certain contingent costs with uncertainty as to their timing and magnitude but that should nonetheless be taken into account. If these contingent costs are not covered sufficiently, they may threaten the financial position of the utility if and when they materialize into actual expenditures.

Keywords:

Ladder of options
Pollution load
O & M costs
Capital costs
Capital expenditures
Assets
Debt (service)
Return on capital

2.1 Cost Estimations for Different Levels of Sanitation Services

What are the investment costs?

The cost of a latrine can vary widely, from a few dozen to a few hundred euros depending on the technology used, the number of pits, whether the pit is lined, the design and comfort level of the superstructure, the proportion of imported mate- rials used, etc. To give an indication of the possible price ranges, the Table below provides a few examples of costs recently observed in West Africa (the table shows the investment cost, excluding land and including equipment, materials and labor).

Caution: the costs provided below are for illustrative purposes only and do not reflect the wide variety of situations and practices encountered in the different countries in sub-Saharan Africa.

Technology	Commonly observed price range
Single or 1 pit SanPlat latrines	40 to 100
Single pit pour-flush toilet	100 to 250
Double pit pour-flush toilet	150 to 350
Single pit VIP latrine	100 to 300
Double pit VIP latrine	250 to 400
Integral septic tank	300 to 800
EcoSan latrine	350 to 60
Laundry tub + soakaway	50 to 150
Shower + soakaway	50 to 300

Source: pS-Eau and Hydroconseil. All amounts are in euros.

Investment costs for the access segment. [Source: Financing Sanitation in Sub-Saharan Africa, Methodological Guide No.6, ps-Eau, 2011]

2.2 Operating Costs of Network-Based Sanitation

The main cost drivers of providing network-based services are **pollution load and network size** – not very much the volume of wastewater - although energy costs are dependent on volume.

The pollution load – the amount of organic material in the wastewater – is the biggest determinant of treatment costs.

The costs of the collection network itself are driven largely by the length of the network and the levels of groundwater and rainwater inflow and infiltration into the sewer network. Inflows and infiltration determine the required pipe diameters, holding tank capacities, and so on.

In providing the services, the entities/actors responsible will incur

- Operating costs, referred to as **OPEX**; see the table below for a description of the largest components of these costs and
- Capital costs, referred to as **CAPEX** (see next page).

There is great variability across utilities about the percentages that each of these costs represent in the overall cost structure.

Type	Description	Depend on
Operation and maintenance (O&M)	Operating and maintenance costs of the system. The principal components are usually: Staff Electricity Chemicals Services from third parties Bad debts (see below). Generally staff, electricity and chemicals comprise the vast majority of expenses	Service area characteristics Operating efficiency Service Standards
Bad debts	Billings that are expected to remain uncollectible	Collection efficiency Tariffs relative to ability and willingness to pay

[Operating Costs of Network-based Sanitation]

2.3 Capital Costs of Network-Based Sanitation

As mentioned before, there is great variability across utilities about the percentages that each of these costs represent in the overall cost structure.

Type	Description	Depend on
Capital Expenditures	These are capital costs when incurred. They are 'capitalized' on the utility's balance sheet because they will generate benefits for more years than the year in which they are incurred. They include asset renewal and asset expansion as described below. When O&M is not properly done, the necessary rehabilitation then tends to be major and classified as capital expenditure	
Asset Renewal	Capital expenditures in the system's existing assets	Condition of the system Investment efficiency Service area characteristics
Asset Expansion	Capital investments in network and equipment required to expand level of collection, treatment and disposal	Existing coverage level Coverage goals Service Standards Investment efficiency Service area characteristics
Debt Service	Interest and principal payments on loans. If loans are in foreign currency, there is also a currency risk described below. A realized exchange rate loss on a principal payment can be included in debt service	Amount of capital expenditures Tariff and subsidy policy Financing strategy Terms on loans obtained
Return on capital or profit	If there is a profit, it can either be kept in the company or distributed through dividends. The dividends become return to the owner as return on capital invested.	Operating efficiency Tariff policy Financing strategy Dividend policy

[Capital Costs of Network-based Sanitation]

Dr. Justamoment and Ms. Gorightahead

Why is debt service a capital cost?

As waster water collection and treatment requires huge investments, loans have to be taken and debt service can become an important item in the capital cost!

2.4 Contingent Costs of Network-Based Sanitation

In addition, service providers face certain contingent costs (see the table) with uncertainty as to their timing and magnitude but that should nonetheless be taken into account. If these contingent costs are not covered sufficiently, they may threaten the financial position of the utility if and when they materialize into actual expenditures.

Type	Description	Depend on
Exchange rate losses	Losses that arise from devaluation of local currency relative to foreign currency. Exchange rate risks can become either realized losses (for instance, when you make a payment on a loan in foreign currency following a devaluation of your own currency) or unrealized losses (for instance, when the value of your debt in foreign currency increases following a devaluation of your own currency)	Loans in foreign currency

[Contingent Costs of Network-based Sanitation]

Dr. Justamoment and Ms. Gorightahead

I never thought of contingent costs and that they can become important.

They sure can become important if you have loans in foreign currency!

Other minor related costs that are usually not covered by the service provider include knowledge and capacity building for the public. Generally, the local authority is responsible for covering this cost related to social mobilization and awareness campaigns as further described in Lesson 5 of this module.

2.5 Costs of On-Site Sanitation

The scope of these costs results mainly from the technology used along the sanitation chain, and from the possibility of generating economies of scale. International lessons learned demonstrate that operating costs are often grossly underestimated. For simple, non-sewer-based systems in rural areas these costs usually are in fact low, especially where on-site disposal (i.e. by the user on private land) is possible without an external service provider providing treatment. With more complex technologies that require greater investment in infrastructure, e.g. for transport and off-site treatment technologies, operating costs may rise dramatically.

Type	Description	Depend on
Capital costs	Capital costs to build the on-site facility	Technology Competition in the sector Service area characteristics
Cost of borrowing	Households that need to finance the costs of building the system will generally have to pay interest	Available sources of finance Terms on loans obtained
Emptying service cost	Pit or septic tanks emptying service costs will include: ▪ Transport and truck capital cost ▪ Fuel cost ▪ Administrative cost, and ▪ Discharge fee. However, in some cases, it can be a discharge premium. In Burkina Faso, the local government gives a subsidy to the treatment plant operator that in turn gives a discharge premium to the collection company. This public incentive intends to avoid uncontrolled discharge.[1]	Operating efficiency Service Standards Discharge standards and policy Service area characteristics
Sludge treatment	Cost to treat the sludge collected and disposed	Operating efficiency Service standards

[Costs of On-site Sanitation]

Further studies / Secondary readings

You may find the following videos, readings, and links helpful to give you better understanding about this lesson's topic. Although it is relevant material, the study is not obligatory to complete the e-Learning lesson successfully.

- ***Targeting Sanitation***

  A short article – provided by senior staff from UNEP from their experience in various countries – addresses the environmental aspects and costs of improved sanitation, and describes the growing global consensus on alternative low-cost technologies. (PDF, 3pp, 95 kb)
  [Link: http://www.ourplanet.com/imgversn/144/vandeweerd.html]

- ***Financing Sanitation in Sub-Saharan Africa, Methodological Guide No.6, ps-Eau, 2011***

  This guide provides highly practical decision-making tools for identifying the type of financing mechanisms to be implemented for on-site sanitation and small-piped sewerage systems.
  [Link:http://www.pseau.org/outils/ouvrages/ps_eau_cms_guide_n_6_financing_sanitation_in_sub_saharan_africa_2011.pdf]

- ***Financial Aspects of Integrated Urban Sanitation***

  This working paper has been designed as a practical tool for use in German financial cooperation. It deals in particular with appropriate financing mechanisms for sustainably improving access to, operation of, and removal of material from, urban sanitation systems not served by a sewer.
  [R.Schuen, KfW 2012: this paper is only available on the course platform]

- ***IRC Sanitation Pack***

  IRC Sanitation Pack, SanPack for short, contains an overview of available methods, techniques and tools in a low-cost, non-sewered sanitation service model. The materials have been developed and used by IRC and its long-standing and more recent partners in the South and the North in some 20 countries in Africa, Asia and Latin America.
  [Link: http://www.washdoc.info/irc_wash_library/irc_sanitation_pack]