Strategic Management Of Water and Wastewater Assets in India

A Primer for Utility Leaders

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Disclaimer

This document is presented solely for informational purposes. The International Water Association and the Indian Water Works Association assume no responsibility for the content or for the opinion or statements of fact expressed in the document.

1. Introduction

The objective of this primer is to provide utility leaders with an overview of the main principles of strategic asset management and its relevance to the water and wastewater sector in India. The primer is an outcome from two workshops on held at the IWWA’s 43rd Annual Water Convention in Chennai, India in January 2011. The workshops focussed on ‘Asset management of water and wastewater projects - problems and remedies’ and ‘Operation and Maintenance of Underground Sewer Networks’. The workshops were organized by the Indian Water Works Association (IWWA) in collaboration with the International Water Association (IWA) as part of the activities of the Operation and Maintenance Network (OMN).
2. Operational and maintenance issues in India

The focus of attention on the targets of Millennium Development Goals related to water and sanitation has been on increasing service coverage, with far less attention being paid towards ensuring the sustainability of services or improving the operation and maintenance (O&M) of existing assets. A global evaluation undertaken by the World Bank’s Independent Evaluation Group in 2009 concluded that most municipal development projects – including those with water supply components - paid little attention to O&M, leading to negative project results and significantly increasing the risk to development outcomes.

The lack of expenditure on O&M and rehabilitation of infrastructure has resulted in a steady deterioration of water and wastewater system integrity and a corresponding reduction in quality of service delivery. High rates of water loss from distribution networks lead to revenue losses which undermine the financial status of many utilities. Sewerage networks, some of which are over a century old, are also poorly maintained and suffering from poor performance in both structural and environmental terms. A recent report by the Central Pollution Control Board (CPCB) reveals that over a third of wastewater treatment facilities in India are violating environmental regulations. This performance failure may be related to inappropriate design but in many cases is due to a lack of adequate attention to operations and maintenance.
3. **What is Strategic Asset Management?**

Asset Management is an integrated process of decision-making, planning and control over the acquisition, use, safeguarding and disposal of assets to maximise their service delivery potential and benefits, and to minimise their related risks and costs over their entire life (WRc 2009).

In order to provide water and wastewater services on a sustainable basis, India’s utilities need to move away from a reactive ‘fail and fix’ approach for O&M towards a proactive approach that ensures that expenditure is used effectively and efficiently to maintain assets in a serviceable condition. It starts from the viewpoint that each asset has a limited lifespan and, during its lifespan, there is increased probability of failure. It also focuses on ensuring that capital maintenance expenditure is targeted towards those assets that are considered to be the most critical for maintaining continuity of service.

Thus, strategic asset management provides a framework for water utilities to adopt a systematic approach for dealing with problems related to O&M. It involves establishing a set of management procedures to ensure improved O&M of existing assets and a planned maintenance investment strategy that reflects the lowest projected total expenditure over the effective life of the asset or assets commensurate with key performance indicators (KPIs) as defined by the utility’s business plan.

In more simple terms, asset management planning involves answering the following:

- *What assets are owned and what condition are they in?*
- *What is the remaining service life of the assets?*
- *What is the probability and consequence of failure associated with the critical assets?*
- *Which assets should be prioritised and when they should for rehabilitation?*
• What is the whole life-cycle cost of different assets taking into account their capital investment and O&M costs?
• What is the most cost-effective approach for reducing risk and continuity of supply?

The asset management approach involves an increased focus on customer-orientated service delivery and meeting standards of service as defined by key KPIs. Thus, asset management plans are closely linked to a utility’s business plan as well as routine operational and maintenance activities.

4. Key components of a Strategic Asset Management Plan

The key components of asset management planning are described below:

Creation of asset database

Although the consequences of asset failure are widely apparent, many utilities in India have very poor information about the assets they own and how they are performing. The creation of a database containing information about physical assets and their locations is therefore the fundamental starting point for effective asset management. Setting up the database in the first instance is a resource intensive activity but improving the quantity and quality of data is an exercise that can be undertaken over a long period of time. As the quantity and quality of information increases, the database can be used to feed into computer simulation models to predict rates of structural deterioration and prioritise assets that are considered most likely to fail.
Assessment of condition

Assessing asset condition is a key facet of good asset management practice. Condition grading can be used as the basis for rehabilitation planning; a minimum condition grade informing decisions about when to maintain, repair, refurbish or replace an asset. This differs from a planned maintenance approach as it means that money is only spent on rehabilitation when the condition of an asset is considered to be detrimental to service delivery or the risk and consequence of failure is considered to be too great.

Identification of critical assets

This activity involves the identification of critical assets i.e. those assets which have most implications on the resultant service delivery as a whole. Identifying and prioritizing which assets are most essential for service delivery, or pose the most significant danger to life and property if threatened or damaged, is therefore necessary for developing an effective asset management strategy.

Whole-life cost approach

Long-term financial sustainability is an important consideration which requires a good understanding of the long-term costs of operating and maintaining existing assets. The aim is to provide the agreed targets for the minimum whole-life cost. In order to minimize costs, the life cycle approach is considered to be best practice internationally taking into account costs associated with operation, maintenance, refurbishment and replacement of assets.

Setting key performance indicators

Rather than considering assets in isolation, a strategic approach towards asset management considers the performance of the system as a result of the combination of linked assets. The strategy for asset management is to link the performance of the system as a whole to the levels of service. This often requires computer modelling to be able to assess the implications of the combined impact of deterioration of assets in various locations in the network. However, the development of computer modelling capability is not the first priority as it is more important to first consider what the KPIs should be and how these will be measured and monitored.
Setting affordable levels of service

Strategic asset management seeks to deliver appropriate levels of service to customers and minimize risk in the most cost effective manner. Therefore, fundamental to asset management is a consideration of the level of service being delivered by the service provider in relation to the expectations of customers, environmental criteria and the ability and willingness of customers to pay tariffs. In India, the expectation is that utilities should deliver water supply 24 hours a day, 7 days a week. A strategic approach towards achieving this goal may result in some interim goals to be defined in order to overcome fundamental asset deficiencies.

Risk assessment

Risk assessment is a key consideration in strategic asset management, in which risk is defined as the product of ‘probability of failure’ and ‘consequence of failure’. The condition and performance of an asset are factors in the assessment of risk, but in relation to the consequences of failure, other factors such as those associated with safety and the environment, and impacts on customer can be incorporated into the assessment. In more advanced approaches towards asset management, risks can be monetized as part of cost-benefit analysis.

5. What next?

Asset management requires that utility managers make rational business decisions about expected levels of service, serviceability targets and the need for new approaches for managing assets. Strategic asset management means that O&M is taken into account during the planning and design stages and this requires changes to business discipline and management culture. Increased levels of sophistication require increasing amounts and accuracy of data and more complex simulation models and management tools to allow the appropriate decisions to be made. However, although there are many complex software systems available that can be used for asset management planning, these are often not required until a utility reaches a more advanced stage of asset management. Of paramount importance in the more immediate term is the need to introduce systems and procedures for collecting and managing information about asset location, condition and system performance.
6. Further reading and sources of information


Includes the following articles:

- **Capital Maintenance: a Good Practice Guide** (Andrew Smith). This paper discusses the principles of a Leading Edge Asset Decisions Assessment (LEADA) initiative driven by Yorkshire Water in the UK.

- **Risky Business: two case studies in asset risk management** (V. Kenneth Harlow). This article describes an effective approach to a risk-based asset decision framework, and suggests the kinds of asset data that the industry must develop to use the framework in a practical way.

- **Benchmarking asset management** (Andrew Foley). This paper describes the principles and objectives of the framework, and its implementation in a multi-national urban water industry project involving 23 participant utilities.

WRc Sewerage Rehabilitation Manual 4th edition (WRc). The WRc Sewerage Rehabilitation Manual was first published in 1984 and since then has gained world-wide recognition as the standard reference work for industry professionals involved in the maintenance and rehabilitation of sewers. It is used throughout the UK for day-to-day maintenance and for strategic long-term rehabilitation planning. The full 4th Edition of the SRM is available on CD and in hard copy. The full contents lists and parts of the manual are available online at http://srm.wrcplc.co.uk which contains a Knowledgebase of ‘General Information’ and ‘SRM Strategic Overview’.

Advanced Water Asset Rehabilitation (AWARE-P) aims at providing water and wastewater utilities with the know-how and the tools needed for efficient decision-making in the scope of infrastructure asset management of urban water services. AWARE-P end-products will include manuals of best practice, software for planning and decision support in rehabilitation (including user guides) and various types of material for training purposes. These will be made available at the AWARE-P website at www.aware-p.org.

For more specific technical information about IWA Strategic Asset Management, you can go to http://iwahq.org/Home/Networks/Specialist_groups/List_of_groups/Strategic_Asset_Management/. For further information about the activities of the group, you can find contact details of membership on the IWA website.
The Operation and Maintenance Network
Supporting sustainable water and sanitation services

The Operation and Maintenance Network (OMN) aims to enhance the effectiveness and sustainability of capital investments in water infrastructure and ensure improved service delivery with benefits for both consumers and the environment. The OMN plays a leading strategic role in promoting effective O&M; providing practical and authoritative advice to water and sanitation system managers and operators in low and middle-income countries. It is coordinated by the National Institute of Public Health in Japan and supported by the International Water Association and the World Health Organization.

The Network offers:

• access to practical guidance material via the online OM toolbox
• technical assistance from experts on O&M issues
• the chance to share knowledge, case studies and develop new guidance materials
• access to regional events and workshops linked to wider capacity building activities.

Any persons or organisations interested in receiving support or contributing to the Network’s activities can join by registering at www.operationandmaintenance.net. For further details, email Kirsten de Vette at Kirsten.deVette@iwahq.org