



Introduction

WP 5.1 has the overall objective of providing a methodology to prove the efficiency and benefits of operational methods and maintenance schemes developed and improved in TECHNEAU (with regards to water quality, reliability of water supply and customer service). The purpose of this report is to provide a basis from which to make informed decisions about how best cost-benefit analysis (CBA) can be applied to evaluate the remedial options implemented at end-user sites to make improvements to the water supply systems.

Importance

CBA is increasingly being used in the water sector to justify investment needs and improvements of water quality and other serviceability parameters. It provides a structured comparison of all the costs and benefits when deciding on the optimum level of water quality improvement schemes. This report has set out a methodology or framework for undertaking a CBA of implementing technologies from TECHNEAU.

CBA seeks to provide the information necessary (in terms of costs and benefits) to evaluate the profitability of implementing technology to improve water quality. While carrying out a CBA requires time and effort, the information gained from a good quality CBA can provide significant pay-backs by improving the decision making process.

Approach

A framework of a CBA tool is discussed in the report. The key elements of the analysis were identified as follows:

- A base case or “without-project” scenario which represents the current level of service and the current cost to the Water Service Provider (WSP). This should be compared with the “with-project” scenario.
- Planning period/horizon in years for the appraisal.
- Identify and estimate costs over the planning period including operating expenditure (opex), capital expenditure (capex), social and environmental costs. This involves identifying and quantifying the cost to the WSP of the intervening mechanisms that will provide improvements to all the aspects of drinking water enhancement identified from a customer focus group.
- Identify and estimate benefits to WSP, customers, and society as a whole over the planning period (expressed in terms of monetary benefits, cost savings or both). This involves deriving customer benefit, in monetary terms, of these improvements in aesthetic service provision through a *large – scale customer willingness to pay survey*.

- A discount rate to convert future values to present values.
- Risk and sensitivity analysis to integrate risk and uncertainty into the framework.

There are two parts to the CBA that need to be carried out:

- Firstly, a forecast of the costs and benefits of each option (e.g. “without project” and “with-project”, e.g. incorporating TECHNEAU operational improvements) needs to be made to convince end-users to implement (or otherwise) the operational improvements.
- Secondly, the actual costs and benefits need to be monitored and quantified after implementation to prove the effectiveness of the operational improvements.

Result

The main goal is therefore to use the framework developed (as discussed above) to analyse cost and benefits of new technologies from TECHNEAU WA5 by developing a spreadsheet-based tool. End-users in TECHNEAU WA5 can be used as case studies for 2-3 different technologies. These case studies will provide an illustrative guideline as to how the CBA framework developed can be used for improvement technologies and incorporating results from TECHNEAU.

More information

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TECHNEAU Knowledge Integrator (TKI) categorisation *Categorisation of Knowledge Packages*

Categorisation (i.e. classification, contains and constraints) of knowledge packages (KPs) can be carried out by 'checking' the appropriate boxes in the attached tables. For example, for a KP investigating point-of-use treatment suitable for a developing world country, the following might be checked:

Classification: Process chain – Tap (Customer) – Point-of-use (POU).

Contains: Report; Literature review.

Constraints: Low cost; Simple technology; No/low skill requirement; No/low energy requirement; No/low chemical requirement; No/low sludge production; Developing world location.

Note that only the lowest level classification needs to be checked, e.g. Point-of-use (POU) in the above example.

Meta data can be included under the 'More Information' section of the Executive Summary Report, i.e. Author(s), Organisation(s), Contact details (name and email), Quality controller (name and organisation) and Date prepared. (The TKI administrator can enter Source (= TECHNEAU), Date submitted (TKI) and Date revised (TKI)).

TKI Categorisation

Classification			
Supply Chain	Process Chain	Process Chain (cont'd)	Water Quality
			Water Quality (cont'd)
Source	Raw water storage	Sludge treatment	Legislation/regulation
- Catchment	- Supply reservoir	- Settlement	- Leakage
- Groundwater	- Bankside storage	- Thickening	- Raw water (source)
- Surface water	Pretreatment	- Dewatering	- Treated water
	- Screening		Chemical
- Spring water	- Microstraining	- Disposal	- Organic compounds
- Storm water	Primary treatment	Chemical dosing	- Inorganic compounds
- Brackish/seawater	- Sedimentation	- pH adjustment	- Disinfection by-products
- Wastewater	- Rapid filtration	- Coagulant	- Corrosion
Raw water storage	- Slow sand filtration	- Polyelectrolyte	- Scaling
- Supply reservoir	- Bank filtration	- Disinfectant	- Chlorine decay
- Bankside storage	- Dune infiltration	- Lead/plumbosolvency	Microbiological
Water treatment	Secondary treatment	Control/instrumentation	- Viruses
- Pretreatment	- Coagulation/flocculation	- Flow	- Parasites
- Primary treatment	- Sedimentation	- Pressure	- Bacteria
- Secondary treatment	- Filtration	- pH	- Fungi
- Sludge treatment	- Dissolved air flotation(DAF)	- Chlorine	Aesthetic
Treated water storage	- Ion exchange	- Dosing	- Hardness / alkalinity
- Service reservoir	- Membrane treatment	- Telemetry	- pH
Distribution	- Adsorption	Analysis	- Turbidity
- Pumps	- Disinfection	- Chemical	- Colour
- Supply pipe / main	- Dechlorination	- Microbiological	- Taste
Tap (Customer)	Treated water storage	- Physical	- Odour
- Supply (service) pipe	- Service reservoir		
- Internal plumbing	Distribution		Water Quantity
- Internal storage			
			- In regulations and

