Benchmarking Course

Reader Benchmarking Water Services

Materials directly supporting the lectures:		
	Blokland (2010). "Benchmarking Water Services Delivery", in M. Kurian and P. McCarney (eds.) "Peri-urban Water and Sanitation Services: Policy, Planning and Method". Published by Springer Verlag.	3
Additional reading materials in support of Topic 4:		
1	Blokland et al (2010). "Rejuvenating a veteran benchmarking scheme: benchmarking in the Dutch drinking water sector", in Journal of Competition and Regulation of Network Industries, Vol 11 (2010), No.2	29
2	Water Utility Management International (2008) Special Issue Benchmarking	51
Additional reading materials in support of Topic 10:		
1	Blokland (2011). Benchmarking for Pro-Poor Water and Sanitation Services Provision: an Emerging Indicator Framework	83
Reading List		93

Key Benchmarking Manuals (not included)		
1	Enrique Cabrera Jr. et al (2011). Benchmarking Water Services. Guiding water utilities to excellence. Manual of Best Practice. IWA Publishing, London.	
2	Helena Alegre et al (2014). Performance Indicators for Water Supply Services. Manual of Best Practice. Third Edition. IWA Publishing, London.	
3	Rafaela Matos et al (2003). Performance Indicators for Wastewater Services. Manual of Best Practice. IWA Publishing, London.	
Interesting websites		
1	www.vewin.nl	Association of Dutch water utilities
2	www.waterbenchmark.org	European Benchmarking Cooperation
3	www.ib-net.org	International Benchmarking Network WB
4	www.wasreb.go.ke	Regulator Kenya
5	www.nwasco.org.zm	Regulator Zimbabwe
6	www.pas.org.in	Performance Assessment System (PAS) project, India

Benchmarking Water Services Delivery

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Blokland, M.W. Benchmarking Water Services Delivery

11 Benchmarking Water Services Delivery

Abstract
Benchmarking began as a process used by the manufacturing industry in the 1970s. As companies found themselves facing greater competition, they devised methods of comparing practices, in order to improve efficiency and thus secure their survival in the marketplace. By the 1990s, public services began to adopt the concept of benchmarking for their own needs. By adapting the methodology to match their mission, context and resource constraints, water utilities have been able to improve the quality of services offered, while also meeting the demands for greater transparancy. Customers and associated interest groups are using a different set of performance assessment tools that has proven successful in exposing and improving the quality of public services. This chapter explores how water utility providers and communities have adapted performance assessment tools, and demonstrates the variety of ways they can be used within the public services domain.

Keywords
Benchmarking
Performance assessment
Water utilities
Communities

11.1 Introduction

Benchmarking originated in the manufacturing industry in the 1970's as a strategic tool to stay ahead of competitors. After some time, benchmarking also entered the public domain where it is increasingly being used by regulators, national and local governments and public enterprises as a means to enhance both the transparency and the performance of public services. Water utilities have been using benchmarking since the nineteen nineties and the use of water utility benchmarking has since spread and is now being used worldwide.

This chapter provides an introduction on the evolution, definition and methodology of benchmarking and then focuses on the application of benchmarking in the water services sector. In its most mature form, water utility benchmarking is a complex and costly exercise, but the experiences with water utility benchmarking show a variety of valid applications ranging from a basic level that uses a small number of easily accessible indicators to an advanced level with multiple indicators that cover all business processes. Water utility benchmarking typically focuses on product quality, customer satisfaction, innovative strength, and finance and efficiency, with a tendency to include environmental and social impacts of water services operations. In the Netherlands, drinking water companies have jointly conducted highly effective benchmarking exercises over a twenty year period and results show that water quality continues to improve, that service quality is at a high level, that environmental performance is improving, and that prices and costs decrease when adjusted for inflation. The final section of this chapter reviews a different set of performance assessment tools that are more tailored to the needs and resources of the users of public services and related interest groups. The use of these tools has proven to be very effective in engaging local communities, developing social, financial and public transparency, and in promoting the responsiveness of public service providers.

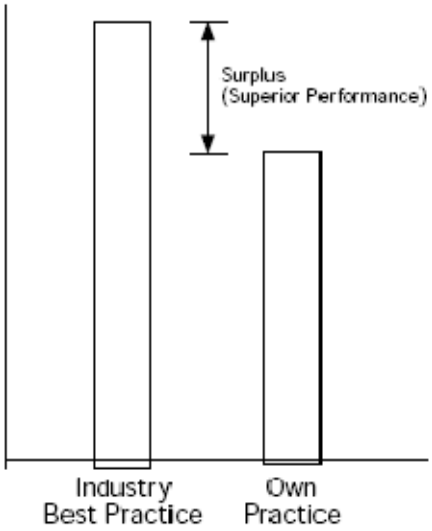
11.2 Definition and evolution of benchmarking

Benchmarking is a method of measuring both performance assessment and performance improvement. It is a strategic tool that allows an agent to improve performance by studying the behaviour of other agents, and by subsequently adapting and implementing (parts of) this behaviour to fit his specific situation.

The varied definitions of benchmarking all emphasise that in order to achieve enhanced levels of performance, one must be ready to learn from others. Boxwell (1994) defines benchmarking as "setting goals by using objective, external standards and learning from others - learning how much and, perhaps more important, learning how". Harrington (1996) states that benchmarking is a "systematic way to identify, understand, and evolve superior products, services, designs, equipment, processes and practices to improve an organisation's real performance" and describes the approach as a "never-ending discovery and learning experience".'

Figure 11.1 shows the performance gap between one's own practice and that of industry's best. The gap or surplus expresses the challenge to improve one's own processes. In competitive industry, the ability of an organisation to close the performance gap may signal the difference between survival and demise.

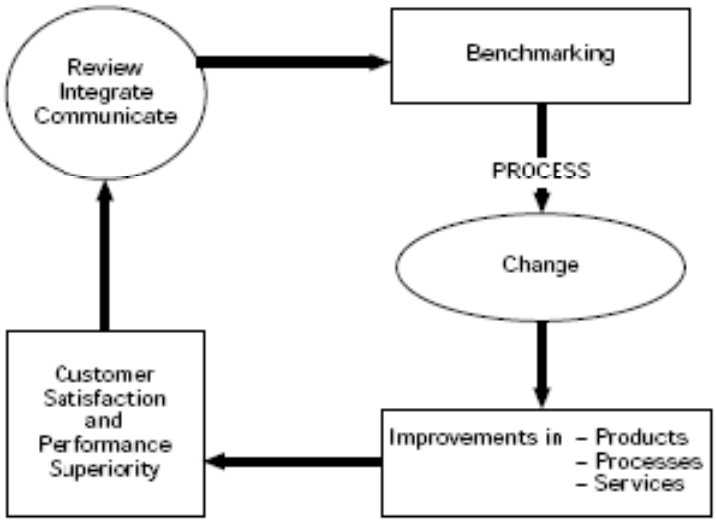
Figure 11.1: Concept of superior performance



Source: Fong (1998)

The concept of benchmarking is illustrated in figure 11.2. It is an endless loop where benchmarking is applied to a particular business process that is subsequently enhanced, leading to better quality products, processes or services that can be expressed in terms of increased customer satisfaction and/or better performance. Upon review, the process starts afresh with a focus on the same or another business process. There are four distinct characteristics to the process: it is a systematic approach, it has a cyclical nature, it is about goal setting and achieving, and it requires commitment at all levels.

Figure 11.2: Benchmarking cycle



Source: Booth (1995)

Benchmarking originated as a strategic tool to stay ahead of competitors in the manufacturing industry in the 1970s. It was reportedly first used by Xerox when the

company, a world leader in copying machine manufacture, rapidly lost market share to Japanese competitors that sold equally good machines for less. The history of the rise, fall and repositioning of the company is illustrated in the following sequence (Boxwell, 1994):

- For nearly 20 years, Xerox enjoyed a near-monopoly in the copier industry (patent protection/high growth).
- By 1975, Xerox had a world market share of 75%, and revenues of US$ 4 billion, but earnings declined for the first time since 1951.
- By 1980, their market share had dropped by half.
- In 1979, Xerox began competitive benchmarking and in 1981, the practice was enforced throughout the company: 'every department should be benchmarking itself against its counterpart department at the best companies we compete with' (as stated by David Kearns, Xerox CEO in 1981).
- By 1990, Xerox had regained much of its lost market share and was able to compete successfully with more than 100 copy machine makers worldwide.

Table 11.1 shows how the Xerox company engaged in benchmarking with several companies, each time focusing on a different business process in which the competing company was considered a leader.

Table 11.1: Benchmarking companies and processes by Xerox

Company	Process
American Express	Collections
American Hospital Supply	Inventory control
AT&T	Research and development
Baxter International	Employee recognition; human resources management
Cummins Engine	Plant lay-out and design; supplier certification
Dow Chemical	Supplier certification
Florida Power and Light	Quality process
Hewlett-Packard	Research and development; engineering
L.L. Bean	Inventory control; distribution; telephonics
Marriott	Customer survey techniques
Milliken	Employee recognition
USAA	Telephonics

Source: Boxwell (1994)

Benchmarking rapidly spread across the manufacturing industry and through private business, becoming a useful strategic and operational tool, often in association with Total Quality Management and Continuous Quality Improvement.

In the 1990s, the process of benchmarking entered the public sector, in such diverse organisations as the Army (recruitment process), hospitals (costs, quality, customer satisfaction), and regulatory agencies (staying ahead of those that are being regulated). Since then, benchmarking has spread out over the entire public sector, to the extent that now the Netherlands Government reports to Parliament on its performance relative to the approved annual Plan and Budget.

Public sector benchmarking is connected to the emergence of New Public Management (NPM). NPM is characterised by market-orientation, customer orientation, increased autonomy of public bodies, decentralisation of authority and greater discretion at lower points within public bodies, lessening of hierarchical rules, and accountability for results. Benchmarking is a necessary tool for assessing and improving performance within the NPM model.

Other performance assessment tools have also been developed that are more tailored to the needs and resources of the users of public services, their representatives and associations, CBOs, NGOs and others. These tools include Public Expenditure Tracking Surveys (PETS) and Community Score Cards. New tools that are entirely Information and Communications Technology (ICT)-based have surfaced recently and proven to have huge potential.

11.3 Benchmarking Methodology and Application

11.3.1 Classification

There is no generally accepted classification of benchmarking. Fong (1998) proposes a classification along three lines: the nature of the referent, the content and the purpose (see Table 11.2).

Table 11.2: Classification of benchmarking

Classification	Type	Meaning
Nature of referent other	Internal	Comparing within one organization about the performance of similar business units or processes
	Competitor	Comparing with direct competitors, catch up or even surpass their overall performance
	Industry	Comparing with company in the same industry, including non-competitors
	Generic	Comparing with an organization which extends beyond industry boundaries
	Global	Comparing with an organization where its geographical location extends beyond country boundaries
Content of benchmarking	Process	Pertaining to discrete work processes and operating systems
	Functional	Application of the process benchmarking that compares particular business functions at two or more organizations
	Performance	Concerning outcome characteristics, quantifiable in terms of price, speed, reliability, etc.
	Strategic	Involving assessment of strategic rather than operational matters
Purpose for the relationship	Competitive	Comparison for gaining superiority over others
	Collaborative	Comparison for developing a learning atmosphere and sharing of knowledge

Source: Fong (1998)

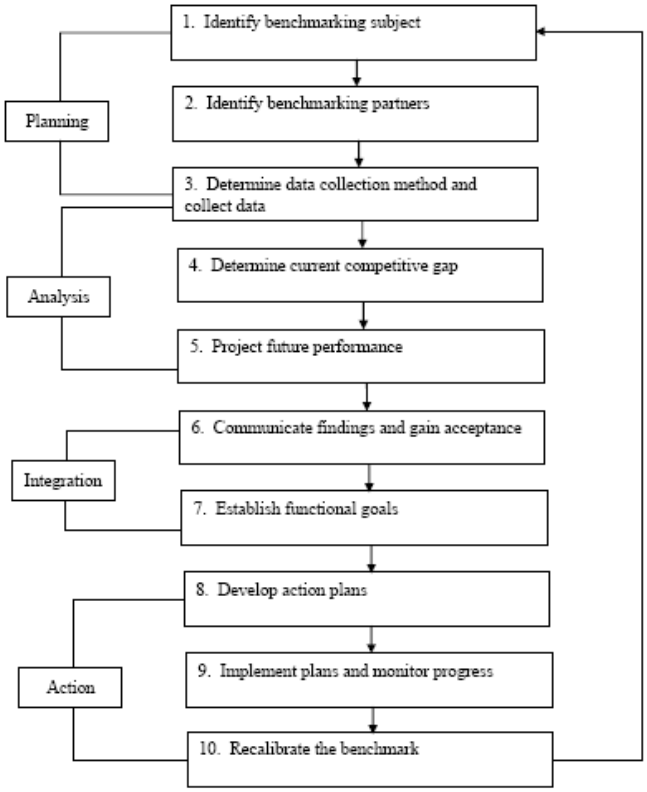
The ‘nature of the referent’ defines the party with whom the benchmarking is being done. Benchmarking can be done internally, comparing similar business units (e.g. comparing water distribution districts), or externally, with other companies in the same sector (e.g. benchmarking water utilities), with organisations in other sectors on common processes (e.g. when comparing customer satisfaction between telecom and water providers) or even internationally (quite common in water utility benchmarking). The ‘content of the

benchmarking' defines levels at which benchmarking may take place, distinguishing for the process, functional (multiple processes), performance (outcome) and strategic levels. All these types are common in water utility benchmarking. The 'purpose of the relationship' defines the character of the relationship between organisations taking part in the benchmarking process. This relationship may be competitive or collaborative, the latter being mostly the case in the benchmarking of (public) water utilities.

11.3.2 Process

Benchmarking is a tool for (re)developing the strategy and operations of an organisation and is an integral part of the planning process. Modelled after the common planning cycle (plan, do, check, act), it typically distinguishes four phases: planning, analysis, integration and action. These phases are executed through a sequence of steps that starts with the identification of the benchmarking subject and ends with the recalibration of the benchmark after a process to seek out, adapt and implement the practices that should result in the enhancement of the value of the associated performance indicators. Figure 11.3 shows the four phases covering 10 steps.

Figure 11.3: Phases and steps in the benchmarking process



Source: Anand & Kodali (2008)

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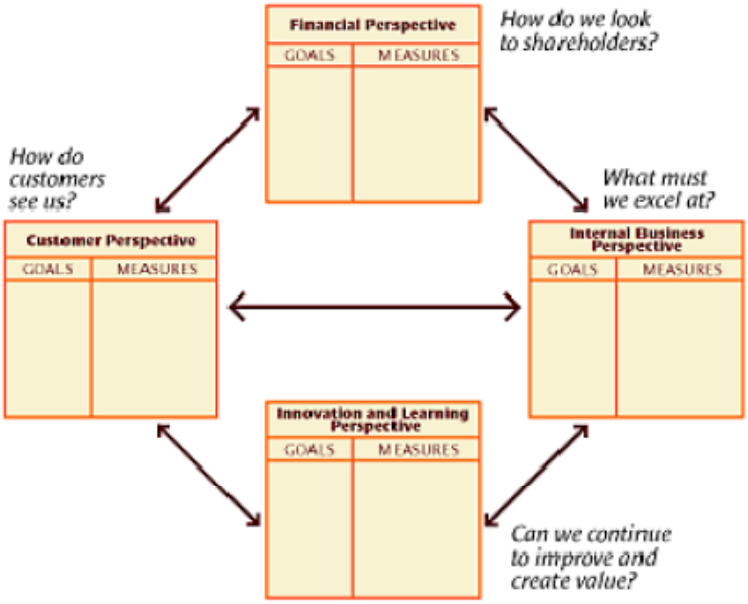
11.3.3 Outcomes

Benchmarking in the private sector has traditionally been aligned with shareholder interests but that focus is starting to change to reflect broader stakeholder interests (Hubbard 2006). The original alignment with shareholder interests delivered four typical benchmarking perspectives: finance, customer, internal business, and innovation and learning (Kaplan and Norton 1992).

Figure 11.4: Balanced Score Card



Source: Kaplan and Norton (1992)

Each of these perspectives can contain a multitude of goals and measures (benchmarks). The outcomes are presented through a Balanced Score Card (BSC), used throughout the benchmarking community (Figure 11.4).

The focus of benchmarking started to change to reflect broader stakeholder interests. In a post-modern society, where businesses are increasingly called upon to shoulder broader responsibilities, in particular the sustainability of their operations, the nature of many organisations has changed. Sustainability is expressed by measuring the impact of business operations on the communities and the physical environments in which they

operate. Consequently, the four conventional benchmarking perspectives needed to expand to include social and environmental perspectives.

In benchmarking terms, this broadened perspective results in a so-called Sustainability Balanced Score Card, as shown in Table 11.3.

Table 11.3: Example of a hypothetical Sustainable Balanced Score Card

Financial			Internal processes		
	Current	Prior		Current	Prior
Sales growth	3.0%	2.0%	Productivity	3.8%	4.0%
Return on sales	6.8%	5.4%	Labour turnover	12.0%	16.5%
Return on assets	5.1%	6.1%	Ave. unit production	4 days	4 days
Return on equity	15.5%	16.0%	Working capital/sales	10.0%	10.0%
Gearing	73.0%	77%	Capacity utilization	73%	77%
Customers/market			**Learning and development**		
	Current	Prior		Current	Prior
Market share	32.0%	30.0%	New products	1	0
No. new customers	12.350	10.145	New markets entered	2	1
Product return rate	1.5%	1.4%	R&D spend/sales	2.5%	1.5%
Defects	2.8%	3.0%	Training spend/sales	5.5%	7.3%
Order cycle time	7 days	7 days	Invest./total assets	10.0%	10.0%
Social performance			**Environmental performance**		
	Current	Prior		Current	Prior
Employee satisfaction	4.1	4.4	Key material use/unit	12.0 kg	10.5 kg
Social perf. of suppliers	3.8	3.0	Energy use/unit	2.0 kW.h	2.3 kW.h
Community relationships	3.0	2.5			
Philanthropic investments/revenue or profit	1.0%	1.0%	Water use/unit	2.5 l	2.6 l
			Emissions, effluent & waste/unit or as a % of total resources used	3.0 t	4.0 t
Industry-specific factor: e.g., community open days	2	1	Industry-specific factor: e.g., GHG emissions	4.0 t	3.8 t

Source: Hubbard (2006)

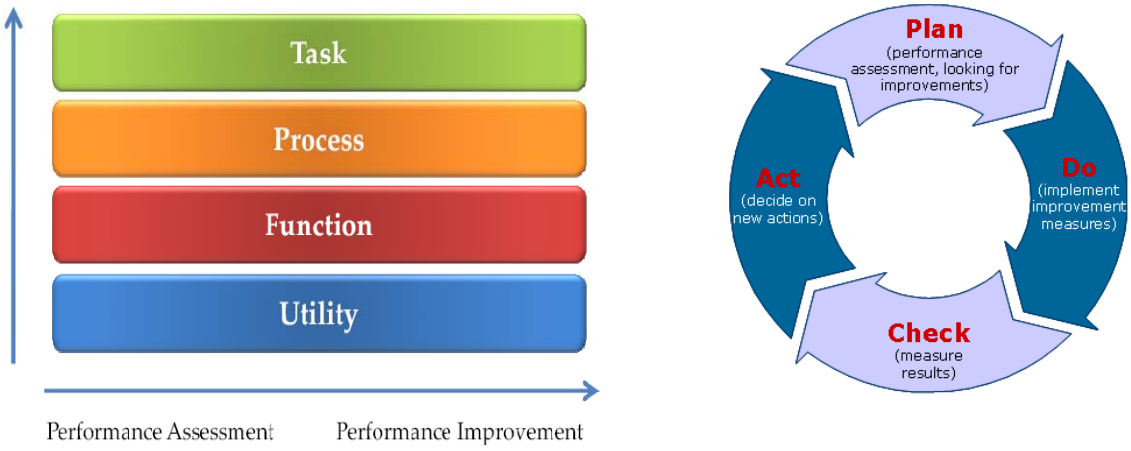
11.3.4 Application in water utilities

Water utilities have been involved in benchmarking since the 1990s and water utility benchmarking is now a common, worldwide activity. The International Water Association (IWA) has played a key role in promoting benchmarking by producing separate manuals for water utilities (Alegre et al. 2006) and for wastewater utilities (Matos et al. 2003). The manuals propose performance indicators, provide a rationale for performance assessment and promote the adoption of a system of performance indicators. The water supply manual identifies 166 performance indicators (PIs) in six categories: Water Resources (4 PIs), Personnel (26 PIs), Physical indicators (15), Operational indicators (40), Quality of service indicators (34), Economic and financial indicators (47). In addition, there are 100 indicators for describing contextual information: utility profile, service information, system assets, consumption and peak factors, demography and economics, and environment. The IWA publications stress the importance of arriving at a system of performance indicators (PIs) but warn against PIs becoming a goal in themselves. The PI system must be determined by each utility, based upon its own management strategy and objectives. After determining these and the required activities

and critical success factors to make them a reality, the appropriate performance indicators can be identified. The IWA also stresses the need for integral performance assessment including four main perspectives (financial, customer, processes and learning, growth) similar to the Balanced Score Card.

The IWA Task Group on Benchmarking works on adapting benchmarking practice for use in water and wastewater utilities. They propose modelling the benchmarking process after the well-known Deming planning cycle, distinguishing the phases 'plan, do, check, act', and also distinguishing between performance assessment and performance improvement (Figure 11.5). The latter two terms replaced the commonly used terms metric and process benchmarking. The latter was thought to be confusing as it incorrectly suggests a focus on the process level (as compared to task, function and utility levels).

Figure 11.5: Benchmarking concepts adapted for use by the water utilities

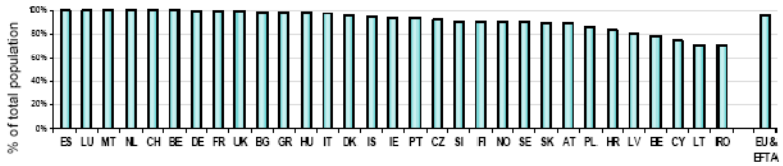


Source: personal communication, Dane (2009)

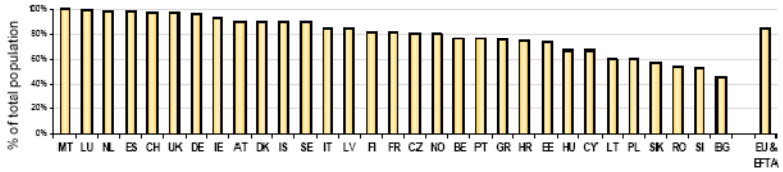
Water utility benchmarking initiatives have been carried out globally. A recent issue of *Water Utility Management* (June 2008) reviewed some of these initiatives, with reports on activities in Brazil, the Netherlands, Tanzania, Hungary, Moldova and China. The issue also reported initiatives on regional and global scales, such as the North European Benchmarking Co-operation supported by water associations in the region, Eureau for the member states of the European Union, and the IB-Net global database, supported by the World Bank. There are numerous other regional and national programmes such as the South East Asian Water Utility Network (SEAWUN) supported by the Asian Development Bank. At a recent water utility benchmarking congress in Amsterdam, papers reported experiences in Austria, Canada, Denmark, Germany, Hungary, Portugal, South Korea and Switzerland.

A typical example of performance assessment is shown in Figures 11.6 and 11.7, showing a comparison of water and sanitation services across the European Union, and of drinking water prices in 14 countries respectively.

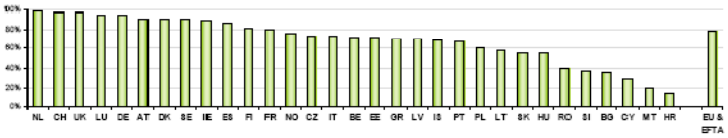
Figure 11.6: Population served by water and sanitation services in member states of the European Union



; Population served by drinking water services (EUREAU, 2008; OIEAU, 2004; WHO-UNICEF, 2008; UN, Statistics Division, 2007).



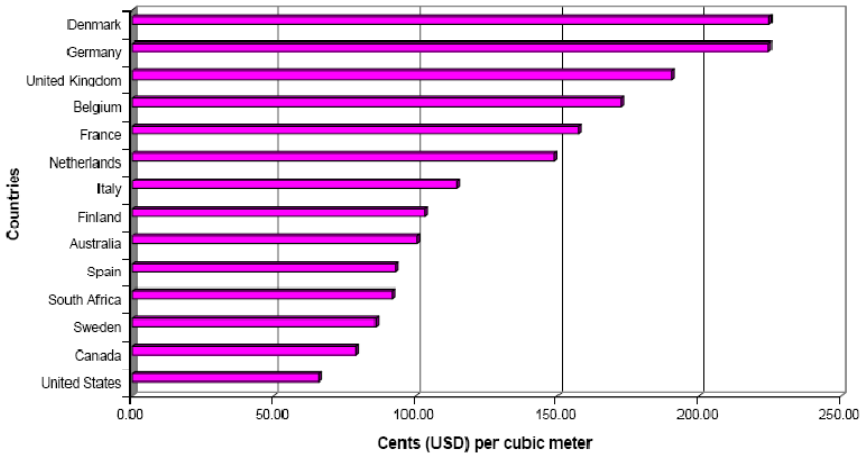
Population served by wastewater collection services (EUREAU, 2008; ECOPROG, 2006; OIEAU, 2004; WHO-UNICEF, 2008; UN, Statistics Division, 2007).



7 % of population served by wastewater treatment services (EUREAU, 2008; ECOPROG, 2006; OIEAU, 2004; WHO-UNICEF, 2008; UN, Statistics Division).

Source: Eureau (2009)

Figure 11.7: Consumer price of drinking water in 14 countries



Source: NUS (2006)

11.3.5 Experience in the Dutch water sector

In the Netherlands water and wastewater services are provided by different organisations. Drinking water is abstracted, treated and distributed by ten supply companies that are incorporated as private companies with exclusive shareholdership by local and provincial governments. Wastewater is collected by the 443 municipalities. Wastewater transport, treatment and disposal are carried out by 26 water boards that are public entities with responsibilities in water management.

Benchmarking in the Dutch water sector was first undertaken by a group of water supply companies in the late 1980s. It started as an inter-company exercise with the results shared between the directors of participating companies. From 1997 onward, the benchmarking results were made public. Later, the water boards and municipalities followed suit, each documenting organisational performance in their own field. The benchmarking activities are conducted on a voluntary basis. The umbrella organisations VEWIN, UvW and Rioned (for the drinking water supply companies, the water boards and the municipalities respectively) play a central role in carrying out the benchmarking, although the actual work is contracted to specialised consulting firms. A large majority of the providers participates in the voluntary benchmarking exercises signalling its widespread importance. In 2010, legislation was passed by Parliament to make benchmarking compulsory for the drinking water utilities.

Benchmarking by VEWIN, the Association of Water Supply Companies in the Netherlands, serves two objectives. It provides greater transparency to interested parties, and provides the water companies with insights on how to improve their processes (VEWIN 2007). The interested parties are central government, customers, supervisory directors and shareholders, and the drinking water companies themselves. Following the tradition of the Balanced Score Card to select four benchmarking perspectives, the water supply companies have chosen their own choice categories: Water Quality, Service Quality, Environmental Impact and Finance and Efficiency. The benchmarking exercise is conducted every three years and the outcomes are twofold: one is a document for public use that is downloadable from the VEWIN website. In addition, each participating company is provided with a confidential, tailor-made report that provides more detailed information and shows the comparative position of the concerned company relative to the others for all performance indicators.

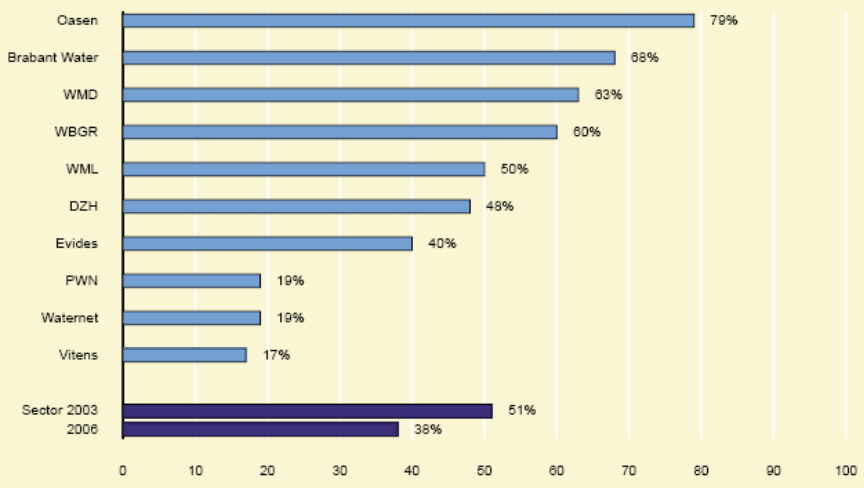
Water quality performance is assessed in three ways: as perceived by the customers, through an index that expresses compliance with legislated standards, and by determining a score that combines non-compliance and the associated health risk. Service quality is measured through a customer survey in which they are requested to mark general service quality, satisfaction with specific services, and the quality of different types of company-customer contacts (compare with the section on community scorecards). Environmental performance is gauged by assessing environmental impacts, both negative (energy consumption, desiccation and treatment residues) and positive (management of nature areas). Financial performance is assessed at company and process levels. At the company level, this includes the unit price charged to various customers and the composition of costs, distinguishing between taxes, costs of capital, depreciation and operational costs.

To make water companies' operational costs comparable on a more detailed level, they are allocated to five processes—production, distribution, process support, sales and general.

The outcome of the four benchmarking exercises conducted in 1997, 2000, 2003 and 2006 show that water quality continues to improve, that service quality is at a high level, that environmental performance is improving, and that prices and costs decrease when adjusted for inflation. The comparison between companies shows significant differences in performance that cannot be explained by contextual factors such as customer density and nature of the water source. Figure 11.8 shows how the performance of the companies differs when it comes to answering customer calls.

Benchmarking is thought to have had a positive impact on the sector, both in terms of increased transparency and economic performance, even more so after the companies decided to publicise the results of benchmarking (Braadbaart 2007).

Figure 11.8: Service quality in Dutch water utilities: Percentage of customer calls answered within 20 seconds



Source: VEWIN (2007)

Benchmarking of the wastewater treatment function of the Dutch water boards was first done in 1999, and then repeated in 2002 and 2006. The organisations made their own choice of five benchmarking perspectives: Treatment, Finance, Environment, Innovation and Stakeholders. Like the water utilities, they added the environmental perspective. Stakeholders included in the benchmark comprise the licencing authorities, the municipalities in their role as sewer operators, businesses that choose to treat wastewater themselves and neighbouring residents. The Dutch water boards use a Sustainability Balanced Score Card. The benchmark serves to answer the following questions: what is the treatment result; at what cost; how environmentally conscious is the organisation; is the organisation able to improve and innovate; and how do the stakeholders view the performance of the organisation? About 80 performance indicators are used overall. The results are presented in a public report that can be downloaded from the website of the

Union of Dutch Water Boards, as well as a confidential, more detailed report for each water board (Unie van Waterschappen 2003).

The overall performance of the water boards can be seen in one summary table that shows the ranking of each of the water boards in each of the five perspectives. Reading the table is made more easy by colouring the ranking, showing the highest ranking nine in green, next ranking nine in orange and worst ranking nine in red (see Table 11.4).

Table 11.4: Ranking of the Dutch water boards for the five benchmarking perspectives

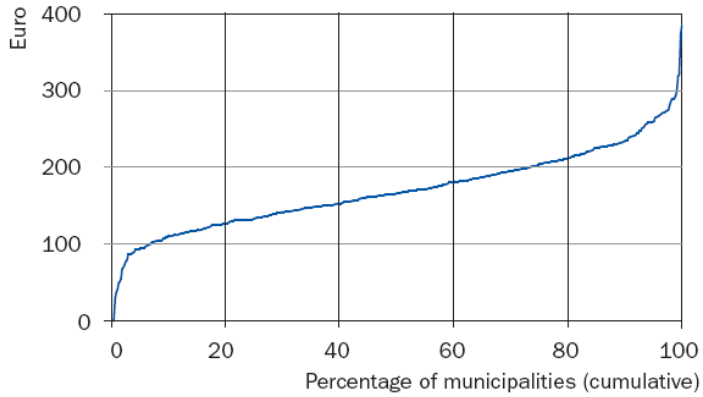
Water Board	Treatment	Finance	Environment	Innovation	Stakeholders
Hoogheemraadschap Amstel, Gooi en Vecht		11	23	4	17
Zuiveringschap Limburg	15	3	20	15	12
Hoogheemraadschap van Delfland	24	15	27	17	
Zuiveringsschap Hollandse Eilanden en Waarden	14	5	18	6	12
Hoogheemraadschap van Rijnland	8	4	5	12	
Hoogheemraadschap Hollandse Noorderkwartier	13	20	2	1	22
Waterschap de Dommel	22	9	19	24	17
Hoogheemraadschap van West-Brabant	16	5	11	17	12
Wetterskip Fryslan	12	13	2	9	17
Hoogheemraadschap de Stichtse Rijnlanden	3	21	9	9	12
Waterschap Rijn en IJssel	10	9	8	2	3
Waterschap Rivierenland	17	19	15	7	3
Waterschap Regge en Dinkel	1	8	9	8	3
Waterschap Vallei & Eem	5	17	12	19	3
Waterschap Veluwe	23	2	23	14	3
Hoogheemraadschap van Schieland	7	18	1	27	1
Waterschap De Maaskant	2	12	7	22	1
Waterschap Hunze en Aa's	20	24	21	16	3
Waterschap De Aa	6	1	15	24	3
Waterschap Groot Salland	21	5	13	3	3
Waterschap Zuiderzeeland		24	4	23	22
Waterschap Noorderzijlvest		21	25	19	3
Waterschap Zeeuwse Eilanden	19	15	17	11	17
Waterschap Reest en Wieden	9	24	5	13	12
Waterschap Velt en Vecht	18	23	26	4	17
Waterschap Zeeuws Vlaanderen	11	24	21	19	22
Hoogheemraadschap Alm en Biesbosch	4	14	13	26	

Rank 1 - 9	Rank 19-27
Rank 10-18	No data

Source: UvW (2003)

Although not a true benchmarking study, RIONED has produced urban drainage statistics covering all Dutch municipalities since 1997 (RIONED 2009). The resulting publication is downloadable. The statistics presented include technical and financial data, such as length, diameter, year of construction and replacement value of sewers, tax collections and sewerage costs. Most statistics show the figures for the entire urban drainage system in the Netherlands, but some statistics show the variation of outcomes across the municipalities, such as the one reproduced in Figure 11.9, concerning the amount of urban drainage tax collected from a multiple person household (urban drainage taxation of households by municipalities are in two categories only: single and multiple person households, the latter irrespective of the actual number of persons). The amount collected in the 441 municipalities varies between a low € 100 and a high € 300.

Figure 11.9: Variation of urban drainage tax for a multiple person household across 441 Dutch municipalities

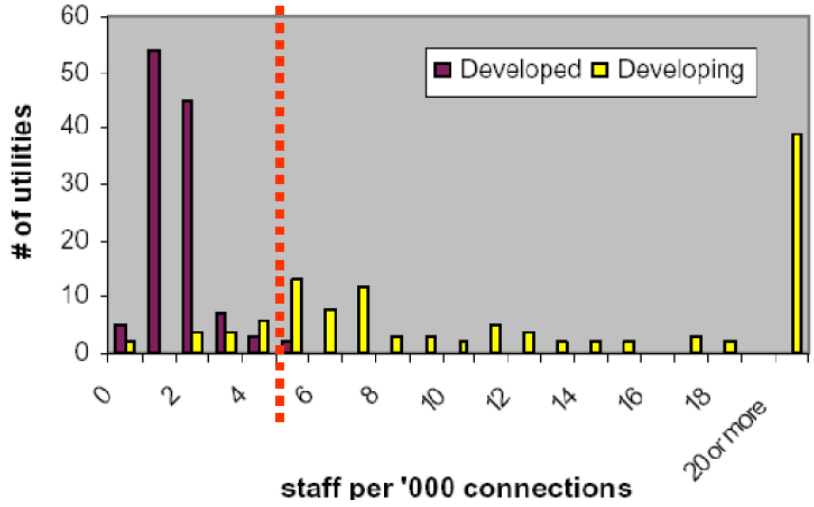


Source: Rioned, 2009

11.3.6 Experiences elsewhere

In a 2005 study, Tynan and Kingdom investigated the performance of 270 water utilities in both developed and developing countries. They proposed a simple, practical benchmarking format based on the generalised objective that 'a well-run utility provides service to all customers who demand it, at a level that meets their needs and which they are willing and able to pay for'. They proposed seven related performance categories: operational efficiency; cost recovery; commercial performance; coverage and access; asset maintenance; service quality; and price and affordability. Interestingly, they provided only one indicator for each category. For example, operational efficiency was defined as the lowest cost of labour, energy, water and the materials in the day-to-day operation of a utility, with the most efficient combination partly dependent on local input prices and prior capital investment decisions. The authors proposed that labour productivity, expressed as the number of staff per 1000 population (or connections) served, be the performance indicator (PI) for this category. A high number indicated inefficient use of staff. Based on their studies, they recommended five staff per 1000 connections for developing country utilities (Figure 11.10).

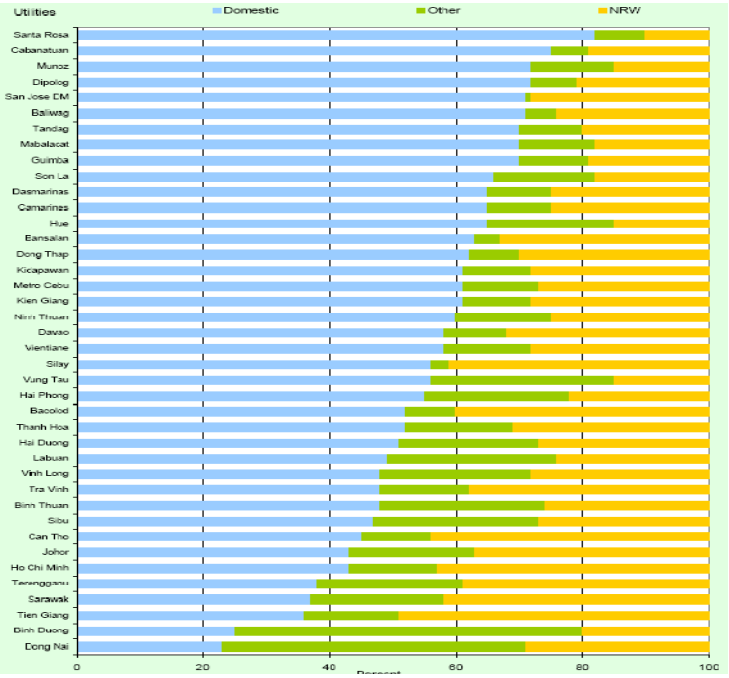
Figure 11.10: Staff per 1000 connections for 270 water utilities worldwide (recommended value: 5)



Source: Tynan and Kingdom (2005)

The Southeast Asia Water Utility Network (SEAWUN) and the Asian Development Bank (ADB) have undertaken performance reviews covering 40 water utilities in four countries in the years 2003 and 2005. This followed up on earlier reviews by ADB in 1993 and 1997. They measured performance in three categories: management, tariffs and operation and maintenance. In management the following PIs were measured: Unaccounted-for-Water (UFW), Non-Revenue-Water (NRW), unit production cost, average tariff, operating ratio, staff per 1000 connections, professional staff, type of annual report, salaries top five positions, priority needs, and Private Sector Participation (PSP). In tariffs, methods of payment, metering, method of collection, tariff structure, rate industrial/domestic tariff, water revenue components, cost of water for domestic use, cost of domestic water at 200 m3/yr, affordability, connection fee, accounts receivable, collection efficiency, sewerage surcharge, and water vending were assessed. Last, in Operation and Maintenance, the areas considered were annual O&M costs, O&M cost components, water meters repaired or replaced annually, leaks repaired annually, annual maintenance expenses, and automation of operations. Figure 11.11 illustrates the results of the study. One issue of concern is the reliability of data. Not all data provided by the participating utilities is 100% reliable and there were some instances where estimates were provided rather than concrete figures.

Figure 11.11: Water use distribution across 40 southeast Asian water utilities



Source: ADB (2007)

The issue of data reliability was the specific subject of a 2004-5 benchmarking study by the Water and Sanitation Programme (WSP 2008) in India. Ten water utilities operating under a variety of institutional arrangements in cities with populations ranging from 0.6 to 6.5 million people, participated in the survey. The study collected data on six performance indicators, namely population coverage, per capita supply, metering ratio,

working ratio, complaints and supply hours. There was an enormous performance range for all indicators (e.g. working ratios varied between 0.8 and 6.6 and supply hours between 0.33 and 12 hours per day). Reliability was distinguished in four categories, with category A referring to a high degree of reliability (25% of the data) and category D to low or negligible reliability (35% of the data). Table 11.5 shows the outcome of the survey and the reliability of the performance values shown.

Table 11.5: Performance and data reliability for 10 urban water utilities in India

		Coverage	Production	Metering	Working ratio	Complaints	Daily supply
		in %	lpcd	% of total connections	Opex as % of oper rev	% of water connections	Hours per day
City Boards	Bangalore	91%	143	90%	1.0	NA	2.50
City Boards	Chennai	98%	107	4%	1.4	44%	3
City Boards	Hyderabad	95%	192	93%	1.1	39%	1
City Company	Jamshedpur	79%	608	1%	0.9	43%	6
City Corp.	Chandigarh	100%	290	71%	1.3	2%	12
City Corp.	Indore	54%	102	0%	5.4	0%	0.75
City Corp.	Pune	88%	274	16%	0.8	NA	7
City Corp.	Rajkot	98%	126	0.4%	6.6	30%	0.33
State Agency	Bhubaneswar	45%	269	1%	3.3	8%	3
State Agency	Dehradun	80%	149	8%	1.4	4%	4
Reliability scale				A*	B	C	D*

** A refers to a high degree of reliability and D refers to low or negligible reliability. Darker the shade higher the reliability.*

Source: WSP (2008)

11.4 Other Performance Assessment Methods

Parallel to the introduction of benchmarking in the water services sector, an activity primarily associated with and executed by utilities and their overseers, other performance assessment tools have been developed that are more tailored to the needs and resources of the users of public services, their representatives and associations, CBOs, NGOs and others. These tools include Community Score Cards (CSCs) and Public Expenditure Tracking Surveys (PETS). In particular, the CSCs have been used extensively in tracking performance of water and sanitation service providers. New tools that are entirely ICT based have surfaced recently and prove to have huge potential.

11.4.1 Community Score Card

The Community Score Card:

- asks service users their opinion about the quality, efficiency and transparency of the service;
- is an instrument for monitoring and evaluation at the local level;
- aims to develop social and public transparency and responsiveness of service providers.

The Community Score Card (Singh and Shah, 2004) is a community-based monitoring tool that combines techniques such as social audits, citizen report cards and community monitoring. The CSC process lends itself to application in rural areas at the micro level,

and can be implemented in a relatively short period of three to six weeks. By including a meeting between the service provider and the community, the process is also a strong instrument for community empowerment. Since the CSC process works deep in the communities, a good result requires an understanding of the socio-political context at a decentralised level, a technically competent facilitator, and a publicity campaign to ensure maximum participation of the community and the stakeholders.

11.4.1.1 Process

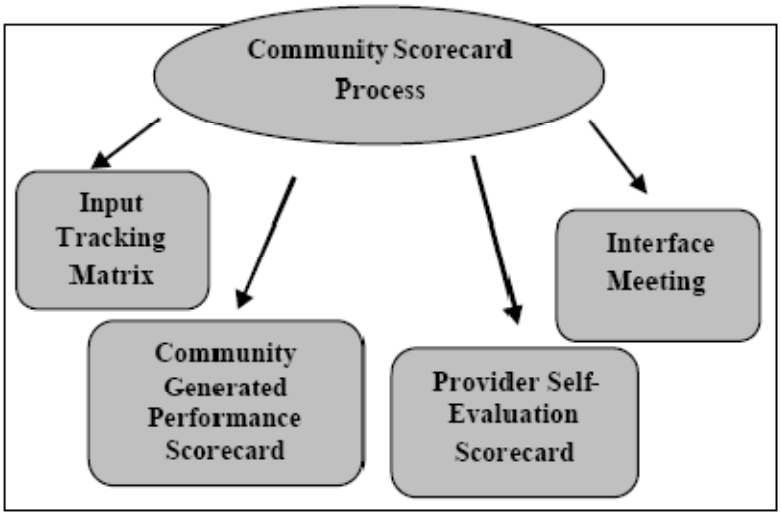
The four components of the CSC process are (Figure 11.12):

1) input tracking matrix,
2) community generated performance scorecard,
3) self-evaluation scorecard by the service provider, and
4) interface meeting between users and provider.

The latter serves to provide feedback and to generate a mutually agreed upon reform agenda.

The implementation of the CSC process distinguishes six key phases. Preparatory groundwork identifies the scope of the CSC and the target communities, establishes the team that is going to execute and assist in the work, and organises a community meeting. Finally, focus groups, which cover the stratification of the community, must be identified. The development of the input tracking matrix requires the organisers to collect supply-side data (facilities, equipment, salaries, etc.), to inform the community and provider about their rights and commitments, to establish the focus groups and to define the input indicators. Once this has been done, the input-tracking matrix can be filled in by all groups and complementary physical inspections can be carried out. An important point to note is that a shortfall in provider performance may be (partially) due to the non-delivery of inputs to the provider. The next phase is the generation of the community performance scorecard, where the focus groups develop and prioritise performance indicators (usually 5 - 8) and discuss and assess the quality of the services delivered. Explanations for the scores and suggestions for improvement are offered. The process for preparing the self-evaluation score card by the staff of the provider is similar to that for the community. The interface meeting between community and provider is key to the success of the CSC process. At that meeting, the outcomes from the input tracking matrix, the community scorecard and the self-evaluation score card are presented and discussed. The meeting must be well facilitated since it is intended to result in concrete measures that will improve service delivery. The meeting must be well attended by both sides. In addition, the attendance of senior officials and politicians is highly desirable to endorse the proposed measures. In order for this meeting to be constructive rather than adversarial, trainings and preparatory meetings are usually organised. The follow-up process ensures the implementation of the proposed measures and may act as an entry point to institutionalise the CSC process and apply it to other services as well.

Figure 11.12 Components of the Community Score Card process



Source: Singh and Shah (2004)

11.4.1.2 Outcomes

Experience shows that the method works quite well. Reporting on a similar study in Ghana, Wateraid (Addai and Dery 2004) concluded that the CSC method is effective in eliciting user (dis)satisfaction with services. Wateraid recommended that the method be used across the country. The report found that community members are very keen to participate and contribute, and that service providers are willing to be criticised and prepared to listen to users. The report also stressed the need for a good and impartial facilitator, to control the focus group discussions and to avoid antagonism from the service provider. Table 11.6 shows the outcome of the CSC process in the Wa district.

Table 11.6: Community Score Card on the performance of public water supply in Wa district, Ghana

Overall District Summary from Five Communities						
Name of Community	Standard Indicators					
	Rate of Water Flow	Number of Water Points	Level of Attention to Customers Demand	Taste of Water	Number of Sanitation Facilities	Community's Overall Scores
Tawonchelle	-	1.33	1	-	2.7	1.68
Gurungu	1.5	-	1.5	-	1	1.34
Eggu	2	-	-	1.5	0.5	1.34
Kata	-	-	-	-	1	1
Tambileju (Jahan)	-	1	1	-	1	1
District Average	1.75	1.17	1.17	1.5	1.24	District Overall Score: 1.28

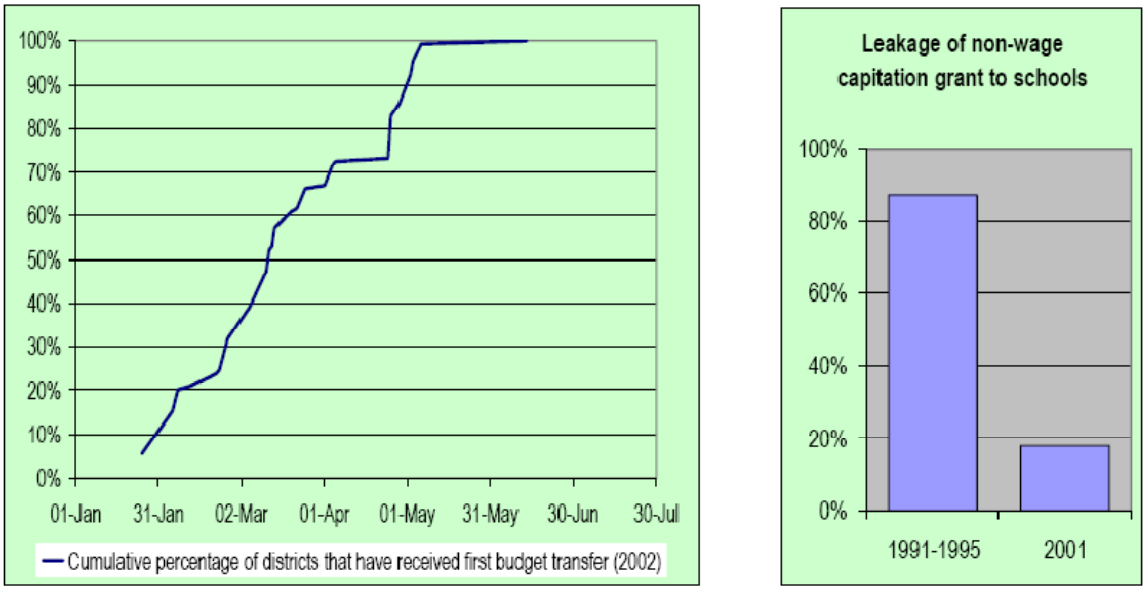
Scale used: 1 (poor), 2 (average), 3 (good)
Source: Addai and Dery, 2004

11.4.2 Public Expenditure Tracking Surveys (PETS)

PETS is a quantitative exercise that traces the flow of funds from origin to destination and determines the location and scale of anomalies. PETS are complementary to qualitative surveys on service delivery. They highlight the use and abuse of public money and give insights into the concepts of capture, cost efficiency, decentralisation and accountability (Waglé and Shah, 2004).

In terms of components and phasing, PETS is similar to the CSC. The first phase is the identification of scope, purpose and actors to establish why, what and who is going to be investigated, who will undertake the PETS, and who will conduct a rapid assessment to confirm availability of data, identify the messenger and recipients of the findings. The second phase is the design of questionnaires, covering multiple data sourcing, characteristics and performance of the facilities, and the mapping of financial flows. The third phase is the sampling phase that confirms the feasibility and cost-effectiveness of the exercise, determines the sample size and executes field-testing. Phase four, the execution of the survey requires the availability of trained enumerators and the fine-tuning of the fieldwork. The fifth phase is data analysis, followed by the final phase of dissemination. Findings are discussed with the relevant authorities to enable them to react and come up with plans for reforms and improvements that may become part of the presentation of the findings. The media are very important to ensure widespread dissemination of findings and thus exert pressure on the authorities to implement reforms. Finally, the follow-up phase includes tracking the implementation of the reforms, and may include institutionalisation of the PETS by government, an independent auditing bureau or a civil society organisation. Figure 11.13 shows sample outcomes of the PETS process, one on delays in budget transfers and one on leakage during transfers (Lindelow 2003).

Figure 11.13 Sample outcomes of PETS on delays and leakages in budget transfers



Source: Lindelow (2003)

11.4.3 GIS-assisted WaSH mapping

This section concerns a recently developed GIS-assisted method for mapping water and sanitation services at schools in Tanzania, as reported by Buberwa (2009). The initiative followed up on a similar project to map water points, and started with a concept note on water, sanitation and hygiene (WaSH) in Tanzanian schools. The note was prepared by three agencies (SNV, WaterAid and UNICEF) to engage in a discussion with the concerned authorities. It led to a pilot project for mapping the current situation regarding school sanitation in two districts. The main objectives of School WaSH mapping are to gain an insight in the current WaSH status at pre/primary and secondary schools and to support the development of a variety of activities such as the dissemination of good practices, capacity-building, awareness raising and infrastructure development. The results of the mapping exercise also serve to start discussions on plans to improve School WaSH with local stakeholders and with responsible ministries.

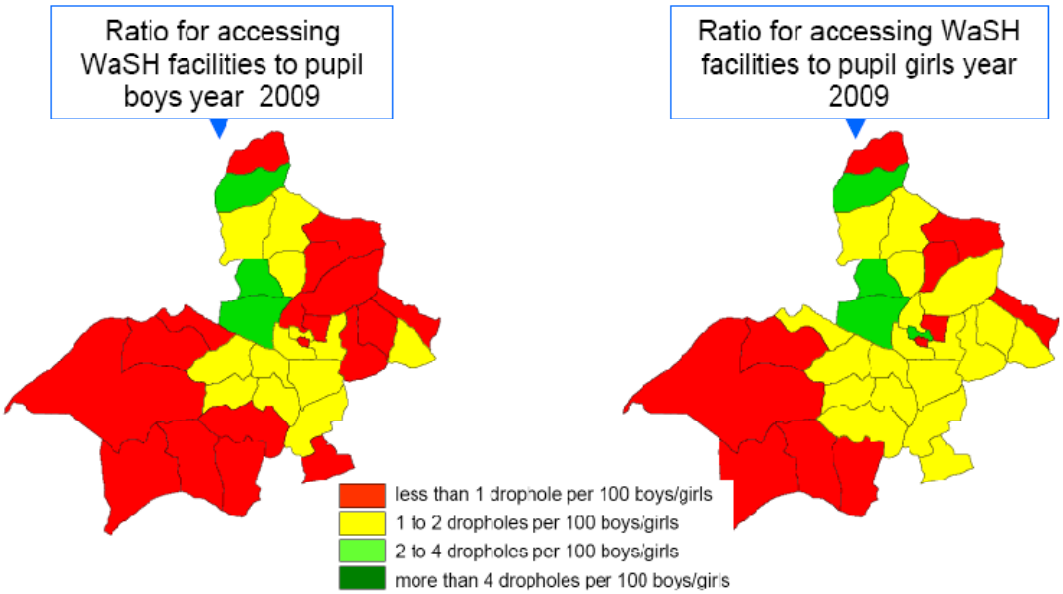
The mapping is done using Mobile GIS, an expansion of a geographic information system (GIS) from the office into the field, based on the use of mobile devices. The mobile GIS system enables field-based personnel to capture, store, update, process, analyse and display geographic information. By integrating three essential components: a Global Positioning System (GPS), rugged handheld computers, and GIS software, the database is directly accessible to field-based personnel whenever and wherever it is required.

The required equipment includes a GPS, a laptop computer, a digital camera, maps, a survey questionnaire and a means of transportation. A GIS/Mapping expert interacts with the client to compile a survey questionnaire, which will be used to capture all required information. The questionnaire is pre-designed in the office and then transformed into a data dictionary, which is uploaded into a mobile device for field data collection.

Before fieldwork can be carried out, digital(ised) maps and textual information is gathered from government agencies. Each school in the study is visited, and location data is recorded in a GPS in the form of the coordinates (Lat/Long), waypoint number and altitude. Facilities are inspected and photographed.

The results of the exercise are presented in a very accessible way: through maps and pictures. The results show substandard access ratios throughout and large inequities across the district (see Figures 11.14 and 11.15). The maps and pictures showed that facilities were more widely available in towns than in villages, that projects had favoured certain wards, and that the quality of infrastructure varied from one place to the other. These outcomes have been presented in meetings with local stakeholders where they raised considerable concerns and initiated the necessary follow-up.

Figure 11.14: Access to school sanitation by ward, Kahama district, Tanzania



Source: Buberwa (2009)

Figure 11.15 Dissimilar sanitation facilities, Kahama district, Tanzania

Source: Buberwa (2009)

11.5 Conclusions

Benchmarking is a continuous search for better practices and superior performance. Although the practice originated in the manufacturing industry in the 1970s as a strategic tool to stay ahead of competitors, it has since entered the public domain where it is increasingly used by national and local governments, regulators and service providers as a means to direct, monitor and account for the performance of public services. Water utilities have been using benchmarking since the 1990s and the tool is now being used worldwide with noticeable, positive effects on the performance of the utilities.

Water utility benchmarking has adapted the methodologies developed in private business to suit its own contextual situation, strategies, objectives and practices. The focus of water utility benchmarking is evolving from its traditional perspectives on finance, internal business, customer, and innovation to include social and environmental aspects of performance. In water utility benchmarking, the number of indicators that are measured range from less than 10 to more than 100. Studies acknowledge the difficulties in collecting reliable data and the considerable costs of benchmarking. These observations result in an emerging practice that differentiates between basic and advanced levels of benchmarking.

Parallel to the introduction of benchmarking in the water services sector, other performance assessment tools have been developed that are more tailored to the needs and resources of the users of public services, their representatives and associations, CBOs, NGOs and others. These tools have been designed to do fact-finding and to promote subsequent interaction between user communities and service providers with the aim to discuss performance and agree on performance improvement measures. The methods include Community Score Cards and Public Expenditure Tracking Surveys (PETS). New tools that are entirely ICT-based have surfaced recently and show huge potential for future development.

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REJUVENATING A VETERAN BENCHMARKING SCHEME: BENCHMARKING IN THE DUTCH DRINKING WATER SECTOR

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Abstract

The voluntary benchmarking system of the Dutch drinking water sector has matured over time. Nowadays it is Europe's most veteran benchmarking scheme of drinking water companies. The system has been praised by many; although also critical notes are heard on whether the system is still as appropriate and effective as it once was. The recent legislative change from a voluntary to a mandatory system provides an opportunity for reflection and change. This paper assesses the lessons learnt from the existing system through an analysis of stakeholder views, in order to identify ways for enhancement.

Keywords: benchmarking; regulation; performance; drinking water; the Netherlands

1. INTRODUCTION

"*I can only conclude that benchmarking works!";* a statement voiced by the Dutch minister of Housing, Spatial Planning and the Environment (VROM) at a speech for the International Water Association, referring to the benchmarking scheme of the Dutch drinking water companies (Cramer, 2007). And she is not the only one exemplifying the Dutch success in this field. Also an organization like the Public Services International Research Unit (PSIRU) from the UK compliments the responsible actor in the Netherlands of the benchmarking scheme, Vewin (The Association of Water Companies in the Netherlands), by finding it to: "… *provide a*

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way of exchanging information and mutual benchmarking at low cost in collaborative effort to strengthen operational performance" (Hall et al., 2009:5).

However, the praise given to the Dutch benchmarking exercise appears to be somewhat at odds with existing literature on benchmarking schemes. This literature, which does acknowledge that benchmarking as a regulatory tool has become more important in the infrastructure sectors over the past decades, highlights a number of concerns. Especially now, with a legislative shift from a voluntary to a mandatory benchmarking system, the time seems right to reflect on whether the benchmarking scheme is as effective as it is intended. What are key lessons learnt from the existing system by the involved stakeholders? Is it still effective or are there signs of erosion? And importantly, can the system be rejuvenated with the legislative changes at hand? We address these questions through an analysis of available literature and an analysis incorporating the responses from interviews with key stakeholders.[1]

We structured our contribution in the following order. First, we derive five key qualifications from literature on the use of benchmarking as a regulatory tool in the public sector. Then we introduce shortly the Dutch drinking water sector. To illuminate the context in which the benchmarking scheme takes place, we provide background data on the sector, how benchmarking evolved in the Dutch water sector, and some key notions related to the new drinking water law. The main research results section follows, consisting of an assessment of the existing voluntary benchmarking system through an analysis of the views of the key stakeholders. These provide the building blocks for our conclusion and recommendations, e.g. the ways to enhance the Dutch benchmarking scheme for the drinking water sector given the context of the new drinking water law.

2. BENCHMARKING AS A REGULATORY TOOL IN THE PUBLIC SECTOR

Benchmarking denotes the process of comparing the current performance of a utility with a reference performance. It finds its origin as an internal management tool, yet over the past decades it has increasingly been promoted as a regulatory tool by way of

[1] The interviews included a limited number of stakeholders: (1) the Ministry of the Environment, Housing and Spatial Planning that oversees the drinking water sector and prepares the concerned legislation; (2) the Municipality of Delft as shareholder of Evides water supply company; (3) a member of the board of non-executive directors of Vitens water company; (4) the executive director of Dunea water supply company; (5) the Director of Vewin; (6) the Chairperson of the Platform of Staff Councils of the water supply companies and (7) the Consumentenbond, the largest Dutch consumer association that has more than 500,000 members. Among the stakeholders that were not consulted were politicians, environmental groups, youth and media. Most of the discussions had a somewhat broader scope than the benchmark only, and included related items such as governance, yardstick competition, tariff and profit regulation that are also subject of the new Water Law and by consequence of political debate.

which competitive pressures can be exerted on a monopolistic industry (Antonioli and Filippini 2002; Dassler et al. 2006). Benchmarking[2] is a relatively 'light-handed' regulatory tool as no direct consequences are attached to benchmarking. A true benchmarking system, like in the Dutch drinking water sector is based on naming and shaming the inefficient companies, and hence promoting productivity. It is sometimes called regulation by 'embarrassment' (CPB, 2000) or 'sunshine' regulation (Walter et al., 2009). If managers care about reputation effects, publication of benchmarking results can be seen as some kind of reward. According to Van Helden and Tillema (2005) both economic and institutional reasoning explain benchmarking in the public sector. Economic reasoning focuses on effectiveness and efficiency of the sector, viewing benchmarking as a substitute for market forces. Participants in the benchmark will feel pressure to act in case negative performance gaps surface in comparison to their peers; therefore shifting towards a more result-oriented corporate culture. Institutional reasoning is derived from neo-institutional and resource dependence theories and emphasizes transparency and social legitimacy.

As pointed out by many authors (Love et al., 1998; Bowerman et al., 2002), there has been a lack of research on benchmarking in the public sector. Folz (2004:218) finds that: "*Benchmarking… is in a nascent stage of both theoretical and practical application in the public sector*". Yet, although the available literature may be limited, it is largely of the same tenor on some key qualifications regarding the use of benchmarking as a regulatory tool in the public sector. Below, we list five key qualifications derived from literature as they may bring impetus for reflection on the Dutch drinking water sector benchmarking scheme.

2.1. THE DIMINISHING MARGINAL VALUE

Several authors argue that a veteran benchmarking scheme, like in the Netherlands, may be subject to erosion and in need to evolve further. Cabrera (2008) points towards the diminishing marginal value of benchmarking results over time. Because the same participants are compared to one another every year, each new round provides less valuable information. The validity of diminishing marginal value is shared by Van Helden and Tillema (2005:343) stating: "*a current benchmarking study may reduce the usefulness of future benchmarking studies*". A second reason for change is that participants are continuously required to use a significant amount of resources

[2] In this article we separate benchmarking from yardstick competition. Benchmarking is only the first half of yardstick competition. Yardstick competition goes further, as in this system the regulator rewards the agents on the basis of their relative performance and therefore generates incentives for promoting efficiency. Agents are forced to compete with a 'shadow-firm' whose performance is determined by average or best practices in the industry (CPB, 2000). The main difference between yardstick competition and the current Dutch drinking water benchmarking system is that the power of the incentive system is much higher in the yardstick system; therefore also putting more reliance on a proper benchmarking methodology.

(human and economic) while the benefits of it may be perceived as disappointing. Continuously top ranked companies may feel that this money can be better spent elsewhere since there is nothing for them to learn from the others, while managers of low ranking companies may not want to damage their egos over and over again. De Witte (2007) finds that the longer the system is in place, the higher the risk of manipulation. Over the years utilities will be able to find the weaknesses and exploit these for their own benefit (higher ranking). Benchmark participants will try to increase virtually the performance through strategic behaviour, instead of the actual performance. Specifically for the Dutch drinking water sector, De Witte notes that a proper functioning of the benchmarking scheme is threatened by the concentration trend in the sector. Over the years a steady decrease in the number of drinking water providers can be observed due to mergers and acquisitions, implicating fewer companies in the benchmark and issues of scale since the largest company is a factor 10 bigger compared to the smallest one. This concern is echoed by Dassler et al. (2006) who argue that the number of companies is important in order to be able to make comparisons between utilities. Although Dassler et al. find the 22 water companies in the United Kingdom to be sufficient for benchmarking, the 10 sewerage companies are considered too few.

2.2. BENCHMARKING AS A STEPPING-STONE

Corton (2003), in analyzing the Peruvian water sector benchmarking scheme, argues that the benchmarking exercise which was initiated in 1999 represents a 'first step' to introducing competitive pressures. The message being that, although for a first step the exercise may have been successful, additional steps are required to maximize the effect of the benchmarking effort. Jamasb and Pollitt (2001:128) also signal a need for especially new regulators to develop the use of benchmarking as a regulatory tool over time. In particular they suggest that regulators need to pay ample attention to developing good data collection and reporting systems. The idea being that the regulator needs to build capacity over time in order to better utilize benchmarking as a regulatory instrument.

2.3. THE CONTEXTUAL CHARACTER

Nemec et al. (2008:674) studied benchmarking in the public sector in Central and Eastern Europe and arrived at the conclusion that success of benchmarking depends very much on "*the concrete conditions and implementation processes*". In other words, the administrative traditions within a given country or location determine to a large extent the implementation and impact of benchmarking. If the administrative context is unsuitable for benchmarking, the full potential of benchmarking is unlikely to be realized. Similarly, Jamasb and Pollitt (2001) highlight the importance of the social

and political context in which the benchmarking exercise takes place. Moreover, the focus of the benchmark should highlight specific challenges and priorities in a given area. The Peruvian benchmark in the water supply sector, for example, highlights coverage of service attained as one of the four specific perspectives[3], which is understandable as only 69% of the population has service coverage (Lin, 2005). By comparison, the Dutch benchmark has environmental impact as one of its perspectives, indicating that in the Dutch context environmental considerations play an important role. Linked to this argument is the observation that the introduction of benchmarking is not always done on the basis of stimulating competitive pressures in the sector. Rather benchmarking can have a 'political' origin and purpose. It has been argued, for example, that the introduction of the Dutch benchmarking exercise in the water supply sector in 1997 was largely a move to thwart off the establishment of an independent economic regulator by the Dutch Ministry of Economic Affairs (Schwartz and Van Dijk, 2005).

2.4. PART OF A REGULATORY PACKAGE

Several authors argue that although benchmarking may be a useful tool, it is in itself insufficient to be the only regulatory tool by way of which the sector is regulated. Dassler et al. (2006:173) assessed utility regulation in the United Kingdom and concluded that, although benchmarking made a contribution to the process of utility regulation, it "*has simply become but one weapon in the regulator's arsenal*". Jamasb and Pollitt (2001), in studying benchmarking experiences in the electricity sector stress that despite benchmarking becoming an important regulatory tool, it should not be seen as a replacement for decision-makers and their judgements. They argue that "*in any area of public policy, final regulatory decisions should ultimately be based on decision-makers' judgements and discretion*" (Jamasb and Pollitt 2001:128).

2.5. THE LACK OF CRITICAL REFLECTION

To these nuances, Rohlfer (2004:535) adds more fundamental criticism. She argues that benchmarking has escaped true critical reflection due to its status as an 'accepted and undisputed' concept. Rohlfer argues that benchmarking gives the impression of 'straightforward objectivity'. This sense of objectivity is promoted by the fact that benchmarking is "*couched in terms of operationalised variables, testable hypotheses and plausible and generally supportive case studies*". Moreover, a review of definitions of benchmarking highlight that benchmarking is strongly associated with

[3] The other three perspectives are quality of service, management efficiency and managerial finance efficiency (Corton, 2003). The term perspective stems from Kaplan and Norton (2005) who defined the Balanced Score Card and the four perspectives of performance benchmarking: customer, innovation and learning, internal business, and financial.

organizational learning (Fedor et al., 1996) or performance improvements to reduce performance gaps. "*Once the notion of 'competitive advantage' or 'superior performance' is accepted, the instrumental value of benchmarking and best practice implementation renders it beyond critique as a moral, social discourse*" (Rohlfer, 2004:536).

3. THE DUTCH DRINKING WATER SECTOR

In the Netherlands, drinking water is abstracted, treated and distributed by ten publicly-owned drinking water supply companies.[4] Jointly, the ten companies supply 1,088 million m^3 of drinking water annually through 7.5 million connections. The volume of water produced has not changed much over the past 20 years. The water supply companies vary in size between 194,000 connections for the smallest company to 2,389,000 connections for the largest company. The total length of the water supply network is about 115,000 km. The raw water sources vary: 55% is abstracted from groundwater, 39% from surface water and 6% is river bank or natural dune filtrate. The companies raise € 1,435 million in revenues, € 1,130 million from domestic consumers and € 305 million from others. The average price of drinking water is € 1.43/m^3 for domestic consumers and € 1.02/m^3 for the others. Nearly 97% of the connections are domestic and together they account for 72% of the total water consumption. Ninety-six percent of the connections is metered and Dutch domestic consumption stands at about 127 litres per capita per day (Vewin, 2008).

All but one of the ten drinking water utilities are institutionalized as so-called Public Limited Companies. A Public Limited Company is a mode of organization where the utility is incorporated as a limited company under company law, but where its shares are owned exclusively by local and/or provincial governments. The essence of the Public Limited Company is that it uses company law as a buffer, shielding the water services business from burdensome public sector rules and regulations (Blokland et al., 1999). A large part of the regulation is done via bylaws of the Public Limited Company. These bylaws, also known as the articles of association or the company constitution, are drawn up and amended by the public shareholders. The bylaws are drawn up before a public notary and need to be approved by the Ministry of Justice for compliance with private company law, and gazetted. This means that each public limited company is differently regulated depending on the intentions of its shareholders. Regulation of water supply companies has largely been attributed to the Board of Non-Executive Directors and the shareholders. In this sense the Dutch water supply companies are largely self-regulating. The Board of Directors is responsible for supervision of the Management of the company and of the general functioning of the

[4] In the Netherlands water and waste water services are provided by different organizations. Wastewater is collected by the 443 municipalities. Wastewater transport, treatment and disposal is carried out by 26 water boards that are public entities with responsibilities in water management.

company. Article 139 (BW:2) specifically stipulates that in performing their tasks the Board of Directors are to be guided by company interests. Similar to the case of the Managing Director, Company Law dictates that the Board members can also be held personally responsible for any mismanagement of the company. The Board has free and unlimited access to all company facilities and information and can advise the Management of the company on any issue it considers relevant. Overall the Board of Directors fulfils the role of a vital linchpin in the governance of a company, looking outwards to the government shareholders and other stakeholders and inwards to its management and staff. The Shareholders Meeting, which is to be held at least once a year, is granted "*all powers, within limits set by Law and articles of association that are not bestowed upon the Management or others*" (art. 107 BW:2). Although article 107 seems to attribute considerable powers to the shareholders, in most large PLCs, the shareholders have little direct control over the management of the company because of limits set in the articles of association. Generally, the powers of the shareholders are limited to approval or rejection of the annual accounts, proposed tariff changes, proposals to amend the articles of association, and ultimately, proposals to dissolve the company. Although the shareholders theoretically have the opportunity to adjust the balance of powers by amending the articles of association, the shareholders generally refrain from doing so.

The provincial and municipal governments control, monitor and enforce the drinking water utilities based on policies formulated by the national government. Ultimately all fall under the responsibility of the Ministry of VROM on the basis of the Drinking Water Supply Act, and the Ministry of Water Management for the abstraction on the basis of the Groundwater Act (Perdok and Wessel, 1998). The Dutch Drinking Water Supply Act is already half a Century old.[5] Initially the law was mainly established to protect public health. Over time several amendments have been made to the law. The most recent of these amendments was in 2004, when the public ownership of the companies was secured in the Act. However, in the 1990s it was already perceived that the law was outdated and should be replaced by a new law taking more specifically into account key contemporary developments like the changing relation between the central government and the drinking water sector, and European legislation in the form of the Water Framework Directive. Hence, as of 1996 preparatory work started on the drafting of a new law. During this process extensive consultation between the government and stakeholders, like the drinking water companies, their association Vewin, the provinces, the Dutch municipalities, and consumer organizations took place. Now, having passed the Dutch bicameral parliamentary system as of July 2009, a new drinking water law will be in effect in the course of 2010.

[5] Notably, before 1957 there was no national legislation for the drinking water sector in the Netherlands. For a period of 100 years since establishment of the sector in the mid 19th Century, the sector relied on self-regulation, possibly explaining the current model of self-regulation.

The defining feature of the Dutch drinking water sector is the high reliance on trust between the various actors. Dutch consumers, for example, need to trust that the water supplied is of good quality and the utility is able to automatically deduct payment for water bills from the consumer's bank account (and the consumer assumes that the utility will not misuse this power). Similarly, the data used for benchmarking is supplied by the utilities themselves and the assumption is that this data is accurate. The fact that water utilities are largely self-regulatory means that although Vewin (the Association of Water Companies) is responsible for undertaking the benchmarking exercise, the utilities themselves (particularly the Managing Director and the Board of non-executive Directors) are responsible for translating the results of the benchmark into concrete internal pressures. In short, the high level of trust, which is seen an important and valuable asset, allows the sector to function the way it is functioning at the moment.

4. BENCHMARKING IN THE DUTCH WATER SUPPLY SECTOR: A HISTORICAL PERSPECTIVE

Three broad phases can be distinguished in the use of benchmarking in the Dutch water supply sector. The first phase concerns a benchmarking exercise between a group of water utilities on a voluntary basis. The results of this exercise were kept confidential. The second phase (from 1997 onwards) concerns the voluntary benchmarking exercise organized by Vewin. In this exercise, the utilities participate on a voluntary basis and the aggregated results are made public. The third phase will begin in 2010, when participation in the benchmarking exercise will become mandatory. Below, these different phases are elaborated upon.

4.1. THE CONFIDENTIAL COCLUWA BENCHMARKING SCHEME

Benchmarking in the Dutch water sector was first undertaken by an association of water supply companies named COCLUWA in the late 1980's. This association was responsible for the genesis of this closed financial and technical accounting system, which has led to annual rounds of voluntary performance comparison among COCLUWA members. The system was implemented by the 11 COCLUWA members from 1989 onwards. It started as an inter-company exercise of which the results were shared between the directors of the participating companies. By the late 1990s, 14 water companies partook in this annual cross-company comparison of performance.

The COCLUWA accounting system was designed to meet a number of criteria. First, all cost items were rigorously and consistently defined so as to maximize cross-utility comparability. Second, figures were up-dated annually. Third, the financial accounts part of the system captured all cost flows: no income or expenditure escaped

from the system. Fourth, the information collected had to be easy to assimilate. To this end the accounts system had a layered structure. The top-most layer consisted of condensed information, essentially one page of key indicators. This layer has a signalling function – it offered management and the Board of Directors a one-page overview of the state of the company relative to last year and relative to the industry. Key parameters provided insight in the efficiency of production and distribution activities, water price, and the financial status of the company.

Underlying this top-level layer was a second layer of more disaggregated data. Whereas the top-most layer provided tailor-made information for strategic decision-making, the second layer supplied a more detailed view of performance in various areas, and could be used for the fine-tuning of different activities. A third layer of data formed a bedrock of raw costs as compiled by administrative staff of the different utilities. The data collection and classification activities carried out in this layer were crucial to the quality of the system, as only a strict adherence to the costing rules as defined will made data truly comparable across companies (Braadbaart et al. 1999).

4.2. THE VOLUNTARY VEWIN BENCHMARKING SCHEME

From 1997 onward, the benchmarking results were made public. The benchmarking activities are conducted on a voluntary basis at the initiative and cost of the concerned service providers.[6] Vewin plays a central role in carrying out the benchmarking exercise, albeit that the actual work of undertaking the benchmark is out-contracted to specialized consulting firms. A large majority of the providers participates in the voluntary benchmarking exercise, signalling that the importance of benchmarking in the water supply sector is widely understood and appreciated.

The voluntary benchmarking that is undertaken by Vewin is stated to serve two objectives, namely to provide greater transparency to interested parties, and to provide the water companies with insights on how to improve their processes (Vewin, 2007). The interested parties are central government, customers, supervisory directors and shareholders, and the drinking water companies themselves (Vewin, 2007). Following the Balanced Score Card framework to select four benchmarking perspectives the water supply companies have made their own choice for the perspectives Water Quality, Service Quality, Environmental Impact and Finance and Efficiency. The voluntary benchmarking exercise has been held every three years since 1997. The outcome of the benchmark is a document for public use that is downloadable from the

6 The Dutch drinking water sector provides the following figures with respect to the costs of the existing benchmarking system (Van Geel, 2009). For the three yearly reporting, the total costs for data collection and processing amount for the entire sector to approximately € 1.000.000, which are partly used to pay for the consultancy agency that does the execution of the task. Next to it Vewin bears additional internal annual costs of € 30.000, while the additional internal annual costs amount to a total of € 560.000. Hence, the estimation of the annual administrative burden of the benchmarking scheme totals an approximate € 920.000.

Vewin website[7] that shows the performance of all participating companies for the various perspectives. In addition, a so-called 'narrow' benchmarking – on the Finance and Efficiency perspective only – is carried out annually. The results of this benchmark are available to the water supply companies only. Each participating company is provided with a confidential, tailor-made report that provides more detailed information.

Detailed protocols have been developed and refined over the years, for each of the four perspectives. Water quality performance is determined in three ways: the assessment of drinking water quality as perceived by the customers, by means of an index that expresses the general compliance of drinking water quality with legislated standards and by determining a score for non-compliance based on the frequency of non-compliance and the health risk. Service quality is measured through a survey, the most recent one covering 6,199 customers that collects marks on service quality in general, on satisfaction with specific services and on the quality of different types of company-customer contacts. Environmental performance is gauged by assessing environmental impacts, both in negative terms (energy consumption, soil dehydration and treatment residues) and in positive terms (management of nature areas). Financial performance is assessed at company and process levels. At company level this includes the unit price charged to various customers and the composition of costs distinguishing between taxes, costs of capital, depreciation and operational costs. To make water companies' operational cost comparable on a more detailed level, they are allocated to five processes, i.e. production, distribution, process support, sales and general.

In principle, the data generated in the benchmark are compared without being corrected or adapted to take into account exogenous factors. The advantage is that this method increases transparency as the raw data can be easily compared. The disadvantage is that because exogenous factors are not incorporated, the interpretation of the results allows for considerable flexibility. As an alternative to the Vewin method, Dijkgraaf and Varkevisser (2007) have developed an alternative to take into account exogenous factors. This allows for a simple efficiency comparison in which exogenous factors are corrected for. The main disadvantage of the alternative method is that the correction of the raw data decreases transparency of the benchmarking exercise (one has to know the correction-function to understand the comparison).

4.3. THE MANDATORY BENCHMARKING SCHEME: FROM 2010 ONWARDS

A key novelty in the new Drinking Water Act is the inclusion of a mandatory benchmark for the drinking water sector, replacing the existing voluntary benchmark. Two reasons have brought the policy makers to replace the existing voluntary

7 www.Vewin.nl.

benchmark to a mandatory system (Van Geel, 2009). Firstly, the government wants to enforce that all companies will participate. According to De Witte and Marques (2009) such was needed. They state that: "*… as new debates on the regulatory system emerged since 2001 (in particular, the government wanted to establish an independent regulator that would apply yardstick competition), the utilities feared its impact and no longer participated in the benchmark (the participation rate in the voluntary benchmark (edition 2003) significantly decreased)*". The second reason for the government to make the benchmark mandatory is to improve the accuracy and reliability of the data and the quality of comparison. Rules on reporting and accessibility of information are desired for better transparency. Specifically, the law poses that this mandatory benchmark is instrumental to increase the transparency of the sector to clients and other stakeholders, and as a means of calibration of utility managers of their own functioning and effectiveness. The new law does not specify how the mandatory benchmark is to be executed, like the frequency or the indicators, but it does specify who is responsible for the benchmark, which is the Ministry of VROM. The Ministry has the possibility to delegate the execution of the benchmark to another party, like the Vewin. The new law suggests that specific rules for the execution of the benchmarking scheme are to be collected in a Protocol, which is to be approved by the Minister of VROM. Also a key new feature of the new law is that all drinking water companies are asked to prepare action plans within 6 months after publication of the benchmarking data on how to improve their performance. In the *Memorie van Toelichting* (Van Geel, 2009) of the new law it is anticipated that the activities coming from the shift from a voluntary to a mandatory benchmarking system will bring additional annual costs of approximately € 250.000 to the government. These costs refer to the evaluation and approval of the post-benchmarking action plans of the companies and the reporting of the benchmarking results to the First and Second Chambers of Parliament.

5. STAKEHOLDER VIEWS ON BENCHMARKING IN THE DUTCH WATER SUPPLY SECTOR

The available data from the four benchmarking exercises dating from 1997, 2000, 2003 and 2006 show for the sector as a whole that the water quality continues to improve, that service quality is at a more or less constant high level, that environmental performance is improving and that prices and costs decrease when adjusted for inflation. The comparison between companies also shows significant differences in performance that cannot be explained by contextual factors such as customer densities and nature of the water source. One example is in service quality where the percentage of customer calls answered within 20 seconds is 38%, varying between a low 17% and

a high 79% (Vewin, 2007). Schmitz and Dane (2008) claim an efficiency improvement of 23% over the period 1997 to 2006.

5.1. THE ACADEMIC VIEW

The economic rationale of the Dutch benchmarking scheme has been subject of research by several academics. By comparison, little attention has been paid to issues of water quality, service quality and environmental impact.

Braadbaart (2007) investigated time series data on benchmarking and non-benchmarking water utilities during the period 1989 to 2000, thereby distinguishing for the period prior to 1997 when the benchmarking was confidential and the period after 1997 when the results were made public. He reports that "*benchmarking information rippled outward from utility managers to boards of directors (1992) and the public at large (1997)*" and "*put boards of directors in a better position to judge the performance of utility managers and enabled customers to judge the effectiveness of their water service providers*". Interestingly, he finds that benchmarking did not affect utility performance until benchmarking results entered the public domain. During the confidential period the performance of participating utilities "*did not converge nor did benchmarkers outperform non-benchmarkers*", and a "*pattern of convergence became visible only after the shift to public benchmarking in 1997*". With respect to the economic rationale, Braadbaart found that benchmarking did enhance the performance but only after 1997. For the latter finding two explanations are suggested, one is that of a necessary time lag between performance assessment and the impact of related reform measures. The other one is that "*managers became serious about internal reform only when benchmarking was publicised*".

Dijkgraaf authored a number of reports and papers on benchmarking in the Dutch drinking water sector in which he presents a number of interesting points. His first observations date back to 1997 when he expected that publication of the outcome of performance comparison would lead to long term efficiency improvements between 9 and 15% and a benefit to the consumer in terms of a 7% lower water bill (Dijkgraaf et al., 1997). In an analysis of the benchmarking results over the period 1997–2002, he found that over the concerned period cost efficiency had improved between 8 and 11%, leading him to conclude that more stringent regulation is not necessary (Dijkgraaf et al, 2005). In recent writings, Dijkgraaf confirms his earlier findings that the benchmark has had a significant impact on efficiency; calculating cost savings of 20% over the period 1997–2006. Based on these positive numbers, his stance is to retain and where possible improve the benchmark (De Witte and Dijkgraaf, 2008). One important concern of Dijkgraaf is the decreasing number of water supply companies that are active in the Netherlands and the effect that this may have on the quality of the benchmark. Without stating a minimum number, he points out that the comparison of performance can be effective only if a sufficient number of companies participate.

He is afraid that the limited number of remaining companies will become too powerful and will claim that cost increases are due to special circumstances and difficulties of cross company performance (Dijkgraaf, 2002).

A study by De Witte and Marquez (2007) compared efficiency improvements in the drinking water sector in five countries. They found that in countries with clear and institutionalized incentive systems such as yardstick competition and benchmarking schemes there is a positive impact on sector performance. The Dutch water companies showed highest efficiency levels and thereby outperformed their sister companies in England and Australia that have institutionalized incentive systems, and in Portugal and Belgium where the prevailing incentive systems are weak. The authors calculated an efficiency improvement in the Dutch drinking water sector of 21% over the period 1997 to 2005.

Conversely, Van Damme and Mulder (2006) argue that the Dutch water consumer has not had the full benefit of efficiency improvements. They argue that the introduction of more stringent regulation would increase financial efficiency by € 500 million over and above the amount of € 100 million that could be achieved with benchmarking. Savings could be achieved by further cost cutting but also by decreasing water company profits that now serve to pay out dividends well above the norm for returns on equity that are used by the regulator OFWAT in the UK.

5.2. THE REGULATOR'S VIEW

The Ministry of Environment, Housing and Spatial Planning (VROM) expressed satisfaction with the voluntary benchmark and with the transparency and the efficiency gains that it has brought. The benchmark has its limitations, but these can be compensated by other instruments of the Ministry's Inspectorate that has important powers in ensuring drinking water quality, continuity and security. Despite this satisfaction, the national government is a strong supporter of the compulsory benchmark, first and foremost as it ensures the participation of all companies. In addition, the central government can now influence the perspectives covered by the benchmark including the development of the associated protocols and the related information requirement. The benchmark will, however, continue to be implemented by Vewin. The implementation will be supervised by the Inspectorate of the Ministry of VROM that will be somewhat expanded to absorb this new task. The criticism that the VROM Inspectorate would not be able to exercise this responsibility for want of expertise, especially in the area of finance and efficiency is cast aside by the Ministry. The Ministry claims to have and to have applied such expertise in sectors such as housing, another task field of the same Ministry. The Ministry does not foresee important or immediate changes to the content or execution of the benchmark. If anything, changes will be gradual, on a longer time scale and in consultation with the sector, as may be illustrated by the fact that the next benchmark in 2010 will be

executed jointly with Vewin and that only the 2013 benchmark will be directed in full by the Ministry.

5.3. THE SHAREHOLDER'S VIEW

The primary interest of the shareholder is that the water supply company functions well and does not generate negative publicity that would adversely affect the municipality. In the present context this focuses attention by the shareholder on the managerial qualities and remuneration packages of the directors and board members of the publicly owned water supply companies; on the assurance of a high level of service; and on a fair price for drinking water. The next level of interest of the shareholder concerns the dividend that is paid out by the water supply company to the municipality. In the case of the municipality of Delft that receives its dividends from the water supply company Evides, it is of key interest that this amount is stable and dependable so that the municipality can count on it when preparing their budgets and longer term financial outlooks. Over the past few years neither the benchmark nor the water tariffs have played an important role in the shareholder meetings. The municipality did not study these aspects and did not prepare positions on either subject in preparation for the meetings. The benchmark is seen as an internal instrument used by the water supply directors for mutual comparison among colleagues, and has served well in avoiding stricter external controls. The introduction of the compulsory benchmark and the leadership over the benchmark by the national government is hoped to improve the quality and credibility of the exercise. This will however require quite an effort and, like the municipalities, the government may not make the means available to truly influence the behaviour of the companies. According to the Chairman of the VNG[8] – representing the interests of the municipal shareholders – the benchmark's main function is to serve the public interest, and it is the role of the Boards of Non-Executive Directors of the water companies to secure this function: "*if you want to anchor the public interests in the Board of Non-Executive Directors, you have to make them accountable to the public*" (Vewin, 2004).

5.4. THE NON-EXECUTIVE DIRECTOR'S VIEW

The non-executive directors have repeatedly expressed their support for the benchmark in combination with the decentralized control of the companies by their shareholders and their boards of non-executive directors. They have insisted that the strategic and operational decisions that stem from the findings of the benchmark are to be with them rather than with the national government. This point of view has been confirmed

[8] VNG is the Vereniging Nederlandse Gemeenten or the Association of Dutch municipalities that represents the interest of the Dutch municipalities. The municipalities compose the largest shareholders of the water companies.

by the recent political debate and found its way into the new water law that confirms the decentralized control, be it that the Minister can now advise the magnitude of some important financial performance indicators such as the solvability and the return on equity. In keeping with the proven Dutch practise of national stakeholder consultation this implies national interest groups, politicians and national government will be in a better position to pressurize the water companies to stay within the prescribed bandwidth. The benchmark is indeed considered a useful instrument in company oversight by the board as it adds to the in-company reports that are provided by company management. The value of the benchmark lies in its external, independent origin and the overseers regard it as a tool that company management should use to understand where the strengths and weaknesses of the company lie, to formulate remedial policy and to account for its performance to the stakeholders. The benchmark is also seen as an incentive and a learning opportunity that keeps the monopolistic water supply companies sharp and so counteracts 'a tendency to fatten up'. The presentation of the findings of the benchmark to the board provides an opportunity for the board to discuss company performance with the management and to challenge them to decide 'what to do and when results can be expected'. The concept of the benchmark as a driver for improved performance has proven its value and will continue to do so in future. The improvement plans that are required by the new law are in that sense only considered useful as a confirmation of present in-company practise and should not end up as a back-door control instrument by central government in a 'Moscow on the North Sea' scenario. Also, too much emphasis on the improvement plans is believed to carry the danger of inviting strategic behaviour aimed to achieve a better position in the benchmark instead of promoting company policies that aim to find the optimum balance of water quality, continuity of supply, security and costs.

5.5. THE MANAGER'S VIEW

Although the directors of the companies all support and participate in the benchmark, they have different opinions about its value. These range from 'a means to check that we are on track but not a policy instrument' (Helder, 2007) to 'a very useful instrument in changing the strategy of the companies from one based mostly on risk aversion and related over-investments to one with an increased focus on costs and optimisation'. The applied benchmarking methodology has been questioned by the director of the OASEN company who commissioned an alternative methodology that corrects the data for exogenous factors. The results were that the OASEN water was indeed the most expensive but also that the company was the most efficient one nation-wide (Vos de Wael, 2006). The directors also experience the benchmark differently, ranging from 'exerting pressure but too little learning' to 'an opportunity to learn' (Vewin, 2004). Despite these differences in opinion, the 'naming and shaming' principle of

benchmarking works. The directors want their company to come out well, maybe not as the best but 'among the top four' (Helder, 2007). Benchmarking has had noticeable effects on company behaviour. In one company that was shown to be among the most expensive, the benchmark has triggered a major reorganisation that has reduced staff numbers by more than half. Investments in new technologies, automation and ICT have also been triggered by the benchmark. By now some directors feel that the instrument has 'reached its limits', become 'blunt' or even 'a ritual' (Helder, 2007). Whilst supporting the view that the largest gains have been made, others point out that improvement potentials of more than 5% remain, representing savings of tens of millions of Euros. Some think that cross-sectoral and/or international benchmarking may provide new challenges (Helder, 2007).

5.6. THE PERSONNEL'S VIEW

The staff councils had already, at an early stage, anticipated that the benchmark would have significant effects on the companies and would lead to organisational change with effects on employment. That change would have come anyway but the benchmark accelerated the process. Over the period 1997–2007 employment in the water supply companies decreased dramatically, by 36% and staff numbers fell from 7,655 in 1997 to 4,893 in 2007 (Vewin, 2008). Labour productivity almost doubled: in 1997 the companies employed 1.19 staff per 1,000 connections and by 2007 this ratio stood at 0.65. The efficiency drive that was reinforced by the benchmark led to the streamlining of the primary processes and the outsourcing of much of the other activities. In addition, a sector-wide project to compare employment conditions of water company staff showed that water company staff was 5–15% better off than their colleagues elsewhere. This outcome was transformed in a revised, more sober benefits package for new employees that is in conformity with the market. The companies also re-designed the employee profile from a grey civil servant executing a routine job to a dynamic employee whose pay is in part performance-related. These profound changes were accompanied by a series of measures to ensure the cooperation of the staff including the introduction of regular, sector-wide employee satisfaction surveys and social plans for staff that became redundant and needed to be transferred, employed elsewhere or send with early retirement. The sector-wide employee satisfaction surveys were initiated by the staff councils and showed staff satisfaction levels below the national averages. They were held twice, in 2001 and 2004 but were discontinued when several of the companies withdrew.

5.7. THE CONSUMER'S VIEW

The consumer organisations have a critical view of the water supply companies because of their monopolistic nature that tends to lead to low levels of efficiency and by

consequence to high prices. They do not share the view that the public shareholders that decide the tariffs are primarily led by consumer interests. They believe that, given the opportunity public shareholders will pursue their own interests as is evidenced by the large dividends paid out to the shareholders and by the unnecessarily high equity that has been built up by the water companies. In this view they feel supported by a report on the energy sector issued by the Dutch Court of Audit that states that the public shareholders are more interested in dividend than in affordable consumer prices (Algemene Rekenkamer, 2008). In the opinion of the Consumentenbond an excess amount of equity to the tune of € 750 million should be returned to the consumers in the form of lower water tariffs. The consumer organisations would prefer a system of price regulation modelled after the yardstick competition in the UK water industry, and would like this instrument to be implemented by the Netherlands Competition Authority rather than the Inspectorate of the Ministry of the Environment. They have lobbied in favour of this approach but have failed in their efforts. In their view the benchmark is a good instrument that has had its benefits but it is just not good enough to get the maximum benefit for the consumers. A dedicated consumer organization like the Waterbond, states that the new water law was a missed opportunity, especially with respect to the benchmarking scheme. In the view of the Waterbond, nothing will really change in comparison to the current voluntary system since the law does not put stringent conditions for implementation of the benchmark, like for example the requirement for an external and impartial execution of the benchmark (Waterbond, 2006). In a survey of 759 households, 60% of the respondents are of the opinion that the government should exercise more control over the water supply companies (PricewaterhouseCoopers, 2008).

5.8. THE EXECUTING AGENCY'S VIEW

Vewin is implementing the voluntary benchmark, with the assistance of a consulting firm that collects, validates and processes the information and data that are obtained from the participating water supply companies. The results of the benchmark are discussed in a meeting of Vewin with the company directors. Also, company-specific reports are prepared by Vewin for presentation and discussion with each company director and his/her management team. Upon their request, Vewin has also informed Boards of Non-Executive Directors on the results of the benchmark. Over the past decade the latter boards have become better suited to the execution of their supervisory tasks, a process that was accelerated by the Dutch Corporate Governance Code 2003.[9]

[9] This Code is more popularly known as the Code Tabaksblat. The Code resulted from a nation-wide study of corporate governance that came with extensive recommendations for the improvement of the functioning of company directors, supervisory boards and shareholders. The Code is legally binding and companies are required to report on the implementation of the Code following the 'apply or explain' principle.

The benchmark has resulted in increased transparency and significant performance improvement. The largest gains have been realized but further improvements to the tune of an annual efficiency gain of 2% are still possible. This will require an ongoing effort in improving and refining the benchmarking instrument and the inclusion of cross-sectoral and international dimensions. The Vewin methodology need not be changed and a changeover to or parallel application of the Dijkgraaf model of benchmarking is not considered beneficial by Vewin. The implementation of the benchmark has brought benefits to Vewin in terms of raising their stature in the Dutch water supply sector, but also internationally through publicity on the Dutch benchmark and the Vewin initiative towards a European benchmarking system.[10]

6. DISCUSSION

Although all stakeholders agree that benchmarking is useful, one could say that the central government in its regulatory role, the non-executive boards of the companies, the companies themselves and their association Vewin are convinced of the benefits and have a high level of confidence in the present and future schemes. By comparison the consumers, the shareholders and the staff are more critical and feel that they have not been fully involved or enjoyed the same level of benefits. The academics have limited their research to the aspects of finance and efficiency and found significant efficiency improvements across the entire sector.

With the switch to a mandatory benchmark next year, it seems to be the opportune moment to rejuvenate the benchmark exercise. The current voluntary benchmarking system does appear to follow Cabrera's (2008) diminishing marginal value in view of the remarks by Directors of the water companies that the exercise in its current format is nearing its limits. The general consensus appears to be that benchmarking is a useful tool, but in itself not sufficient. Even the most critical of the stakeholders, the consumer agency, acknowledges that the tool is useful, although it asserts that the benefits appear to flow towards the company itself and the shareholders rather than the consumer.

Given the nature of the new Drinking Water Act, the rejuvenation of the veteran benchmarking scheme is not so much a task of Vewin, but rather that of the Ministry of VROM. The Ministry of VROM confirms the earlier findings of Dassler et al. (2006) that benchmarking is just one the tools that they have at their disposal. The new Act does provide the Ministry with (expanded) opportunities to redesign the benchmark and to influence what happens with the results of the benchmark (by demanding an improvement plan within 6 months).

The new Drinking Water Act reinforces the tradition of decentralized (self-) regulation by the water companies. This means that the non-executive directors, and

[10] The North European Benchmarking Co-operation.

to a lesser extent the shareholders, retain a crucial task in translating benchmark results to internal company pressures. In view of their statutory task to focus on the company's interests, one could question if these actors are able to fully justify consumer interest and if not some remedial action may be advisable. In fact, the role of the consumer in the regulatory framework appears to be weak. The assumption is that the non-executive directors and shareholders will act on behalf of the consumer, but the question is to what extent this is actually occurring? This role could be strengthened in various ways, e.g. by obliging the non-executive directors to account for their actions to the consumers, or by way of a reinforcing the mandates of the in-company consumer councils or by establishing duly empowered national consumer bodies as in the case of the UK. Having said this, it is noted that the water companies (and the boards of directors) are well aware of the importance of maintaining the high level of trust that they currently enjoy from the consumer and they will be careful not to alienate their consumers.

Our analysis surfaces several methodological innovations that may rejuvenate the system. The methodology developed by Dijkgraaf and Varkevisser (2007) to include exogenous factors deserves attention. De Witte (2007) has argued that both methods have their respective advantages and disadvantages and has suggested using both methods to complement each other. In addition, environmental and learning and innovation perspectives of the benchmark could be developed further to emphasize the longer-term sustainability of the Netherlands drinking water sector. Another way of giving the benchmarking exercise a new impulse is the inclusion of foreign drinking water companies (international European benchmark). Vewin is already involved as co-ordinating partner in the European Benchmarking Co-operation (EBC) and this initiative should be further elaborated. Adding foreign companies in the benchmark would also address the problems associated with the decreasing number of water supply companies in the Netherlands.

7. CONCLUSION

Looking at the economic and institutional rationale for benchmarking, we conclude that it is possible to get even more out of the benchmarking effort of the Dutch drinking water utilities. In terms of the economic rationale, the voluntary benchmarking scheme has generated good results, although we find that these are to some extent subject to erosion. With respect to the institutional rationale the voluntary system has enabled a grand stride forwards.

The self-disciplinary effort of the water companies to initiate the voluntary benchmark through their association Vewin was commendable. At the same time, some stakeholders have conceived this benchmark as an instrument by and for water

company directors. This has hindered the legitimacy and credibility of the voluntary benchmark.

The imminent changeover to the compulsory benchmark that will be developed and carried out by the Ministry of VROM provides an opportunity to make the benchmark a truly impartial and external instrument. Most important in this respect is the way in which the Ministry will fulfil its new role as the responsible entity for the compulsory benchmark. The Ministry may consider some methodological innovations that may give a new boost to the effectiveness of the scheme.

The decentralized control of the companies where it concerns the preparation and implementation of the mandatory improvement plans as a follow-up to the compulsory benchmark may be improved by increasing the involvement of and degree of accountability to the consumers and the consumer organisations.

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water21 magazine of the International Water Association
IWA Publishing

Special issue: benchmarking

If there is one issue that unites water utilities worldwide, whatever their circumstances, it is the challenge of how to improve performance. The emergence of benchmarking as a tool and framework for meeting this challenge is therefore of significance for all those responsible for providing water and wastewater services. This makes it relevant to the utilities themselves, but also to those charged with managing the sector, which increasingly means independent regulators overseeing utility activity.

It is against this backdrop that *WUMI* presents a special issue focusing on developments in benchmarking. A key actor in this area is the World Bank, which manages the IBNET international benchmarking initiative. This special issue has been prepared in collaboration with IBNET, with Caroline van den Berg of the World Bank gathering and editing the feature material.

The International Water Association also plays a key role in progressing benchmarking worldwide. The special issue's overview is therefore provided by Enrique Cabrera Jr., who is closely involved with IWA's activity on benchmarking.

Thanks go to both of these for their input to the special issue, with thanks also to the other authors for their contributions that provide valuable insights into the spectrum of benchmarking activity around the world. ●

Keith Hayward, Editor

EBRD loan to improve Russian services

The European Bank for Reconstruction and Development (EBRD) has agreed a 1.5 billion rouble ($63 million) loan to Russia's Rosvodokanal, one of the country's largest water and sewerage service operators, based on a commitment to bring the company's current and future contracts with municipalities closer to international practice.

The terms of the EBRD's 13-year loan aim to increase investment in the sector by setting a benchmark for the Russian municipal services market. Such a step could, the bank believes, encourage greater foreign involvement in the sector among other benefits.

The EBRD is working closely with Russia's Anti-Monopoly Authority (AMA) in parallel with this move. The AMA is the government body responsible for fair competition policy and the regulation of natural monopolies, its aim being to ensure that long-term leases of municipal assets are awarded on a competitive basis in future.

This deal has also given the EBRD an unusual chance to improve the quality of existing lease arrangements, moving them closer to international standards. The bank intends to duplicate the approach in other projects involving private operators in the Russian municipal services sector.

Under the agreement, Rosvodokanal will revise its contracts with six Russian cities and one region. The new conditions, to be replicated in the company's future municipal agreements, will introduce service targets and penalties for non-performance, as well as requirements for public disclosure.

These contracts will be monitored independently. The loan will be used to co-finance rehabilitation and upgrades to infrastructure in Barnaul, Kaluga, Krasnodar, Omsk, Orenburg, Tver, Tyumen and other cities, and to enable Rosvodokanal to acquire water companies.

Rosvodokanal serves around five million people in eight cities and is part of the privately-held Alfa Group. ●

Australia plans for long-term security

Australian Minister for Climate Change and Water, Senator Penny Wong, recently outlined details of 'Water for the future', the new federal government's plan to secure the long-term water supply for the country.

The country has been suffering badly from a long-term drought and water issues were a major discussion point in the elections earlier this year. Ms Wong noted: 'Climate change means most Australian cities and towns have less water, and we can no longer rely on local rainfall to supply all our drinking water.'

The country's 2008/09 budget will provide new money for three key water-related election commitments, putting a strong focus on urban water. These are the AUD$1 billion ($956 million) national urban water and desalination plan, the AUD$250 million ($239 million) national water security plan for cities and town, and the AUD$250 million national rainwater and greywater initiative.

The first two plans will help secure new water supplies for households and businesses. Ms Wong said: 'These programmes will help us deal with the impacts of climate change and reduce our reliance on rainfall by investing in desalination, water recycling, stormwater re-use and efficient water infrastructure.'

The national rainwater and greywater initiative will enable households to receive rebates of up to $500 for the purchase and installation of rainwater tanks and greywater systems. Funding has been set aside to provide rebates to 500,000 homes over a period of six years. ●

water utility management INTERNATIONAL

EDITORIAL

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Water Utility Management International focuses on the interests of utility executives, policy makers and advisors around the world engaged with the key management issues faced by water and wastewater utilities. As well as senior utility managers, the publication will be of interest to regulators, consultants, contractors, academics, and financial, technical and legal professionals.

Utility reform and achieving efficiency are central themes of the publication, encompassing topics such as benchmarking, investment planning, consolidation, public / private sector roles, leadership, IT, and human resources. Other regular themes include financing, regulation, charging policies, procurement, corporate governance and customer issues.

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ISO publishes guidelines on supply management

ISO has published new guidelines on managing drinking water supplies during crises. The ISO International Workshop Agreement IWA6, Guidelines for the management of drinking water utilities under crisis conditions, is the first of its type backed by international consensus.

Disruptions to water supplies can have serious consequences and can arise from both human interventions such as terrorist attacks and natural causes such as hurricanes.

Water supply organisations of all sizes and types have become increasingly aware of the need to achieve and demonstrate proactive security performance related to their physical facilities, services, activities, products, supply chains, and operational continuity, ISO notes.

It adds: 'They do so within the context of increasing security risks and threats, more stringent legislation and regulation, heightened awareness of the need for adequate emergency response and remediation planning, concerns of interested and affected parties, and the need to assure operational continuity.

'Water security standardisation can be very useful to help water companies face these challenges.'
The IWA6 guidelines constitute the first stage of a comprehensive suite of standards for water security.

ISO notes: 'While the management of drinking water utilities under crisis needs to meet national or regional requirements of relevant authorities, the development of international standards can provide further assistance.' ●

EPA response to effects of climate change

The US Environmental Protection Agency is in the public comment stage of a draft strategy that outlines the potential effects of climate change on clean water, drinking water and ocean protection programmes and outlines EPA actions to respond to these effects and help utilities to formulate their responses.

The 'National water program strategy: response to climate change' focuses on actions designed to help managers adapt their water programmes to respond to the changing climate.

Other elements of the draft strategy include details of the steps needed to strengthen links between climate research and water programmes, and to improve education for water programme professionals on potential climate change impacts.

The strategy also identifies contributions that water programmes can make to mitigate greenhouse gas emissions.

Some of the potential impacts of climate change on water resources reviewed in the strategy include increases in particular water pollution issues, changes in availability of drinking water supplies, and collective impacts on coastal areas.

The document notes that warmer air temperatures will create warmer waters, which will hold less dissolved oxygen, making instances of hypoxia more likely, with potential negative effects for aquatic species.

More extreme water-related events can be expected, including heavier precipitation, which will increase the risk of flooding and the variability of stream flows. Drought and changes to precipitation and snowmelt patterns will also affect water supplies.

Rising sea levels will affect shorelines and displace wetlands, and the warmer waters will see current aquatic life forms displaced by others better adapted to the new conditions. This process, the strategy warns, could allow invasive species to become established. ●

GLOBAL: Business slams 'unacceptable' delays in MDGs
A report from AquaFed, the international federation of private water operators, has reviewed the UN Commission on Sustainable Development 13 resolutions on water and sanitation, made in May 2005, and has concluded that greater efforts must be made. Notably, AquaFed says progress in meeting the water and sanitation MDGs is lagging, particularly the sanitation element, which AquaFed calls 'unacceptable'. It added that to a very large extent public and private sector operators suffer from the same problems in implementing public water policies: unrealistic economics, unsustainable cost recovery, inconsistent planning, absence of long-term targets, and low levels of political support.

US: Government announces major water spend
The Newfoundland and Labrador government has announced that it will provide substantial funding over the next three years to improve drinking water quality in large numbers of small communities. The drinking water safety initiative, unveiled at a news conference, is intended to resolve 70 to 80% of drinking water quality issues in the province. The plan will cost $2.9 million to implement, and $6 million is being earmarked each year for six years, for spending on related upgrades of municipal infrastructure.

US: Mayors meet to look at water and sewer benefits
A recent meeting of the US Conference of Mayors unveiled research by the Cadmus Group and the Mayors Water Council that found investing in drinking water and sewer systems provides only positive returns. While the results vary depending on local infrastructure, the research found that a $1 increase in spending on water and sewer infrastructure provides savings of up to $2.62. Cadmus' research also claimed that one additional employee in the water and sewer services at a local level can lead to 3.68 jobs across the national economy.

US: LA reveals recycled water element in strategy
Los Angeles has unveiled a long-term water strategy that includes adding treated wastewater to the city's supplies and ensuring more water conservation systems are installed in homes and businesses. The plan calls for a 600% increase in use of recycled water, and restrictions will be placed on domestic water uses such as watering lawns. The capacity of a local dam would also be quadrupled and funds would be found to clean up polluted groundwater in the San Fernando Valley.

Radical changes suggested for UK's water industry

A recent report from the UK All Party Parliamentary Water Group on the future of the water sector in England and Wales has moved the countries closer to universal metering, warning that present water use is unsustainable and that use, funding, costs and provision cannot be taken for granted any longer.

The 'Future of the UK water sector' report also calls on the government to do more to ensure consumers, particularly vulnerable groups, are more central to the development of the sector.

Universal metering is stressed as important, combined with social tariffs and possibly also benefits, as a way of supporting vulnerable customers and increasing efficiency savings. The report urges the government to progress its introduction 'as soon as possible'.

The report also provides strong backing for sustainable urban drainage systems (SUDS, or BMPs in the US), saying that the group is concerned about the sector's continued vulnerability to flooding. It calls on the government to immediately address issues around surface water drainage and to clarify ownership and maintenance responsibilities.

Radical changes to the five-year periodic review are also suggested, with a call for a longer term, ten-year focus to capital expenditure, effectively splitting the elements of the current five-year cycle. Both processes would work within detailed 25-year strategic direction statements.

Labelling of water-efficient goods is also backed, as well as a tightening of existing regulations for new and existing houses and the phasing out of some inefficient water products. The group advocates a 'multi-utility' approach in this area and has looked at the potential extension of Carbon Emission Reduction Targets to the sector.

(see Analysis, p4) ●

Business

AUSTRALIA: Government announces winners for Canberra supply work
The Australian state government has announced the four companies that will design and construct AUD$300 million of key infrastructure projects to secure Canberra's water supply. Abigroup, GHD, John Holland and CH2M Hill are the alliance partners who will work on raising the Cotter dam wall, constructing a pipeline from the Murrumbidgee river to the Googong dam, and constructing a water treatment plant that will treat Canberra's wastewater to a very high degree, with the option to put it into the potable water supply in future.

LATIN AMERICA: Banks announce increased cooperation on development
The EIB and IADB have agreed to strengthen their cooperation and co-financing to support strategic development projects in Latin America and the Caribbean. The EIB and IADB have also, with JBIC, co-financed the Panama City and Bay sanitation project, which aims to improve sanitary and environmental conditions in Panama City and the bay area through providing wastewater treatment.

FRANCE: Veolia wins two awards from SIAAP
Veolia Water, via OTV, a subsidiary of Veolia Water Solutions & Technologies, has been awarded two major design-build contracts by SIAAP, the wastewater authority for the Paris area in France. As leader of the consortium for both projects, Veolia Water will be in charge of bringing the Seine Aval wastewater treatment plant in Achères into compliance with the EU's Urban Wastewater Directive. The company will also construct the second section of the Seine Grésillons wastewater treatment plant in Triel sur Seine. The turnover for these two contracts is worth a cumulative total of €224.1 million ($348 million) over the term for the company.

OMAN: Company signs two wastewater contracts
The Oman Wastewater Services Company has signed two contracts for the Al Seeb wastewater project, local media reports. The Al Seeb coastal strip vacuum sewers networks project, worth $225.7 million, involves constructing a 270km long vacuum sewer network along the country's coastline.

UK: Bank warns of utility funding shortfalls
UK investment bank JP Reynolds has warned that 11 utilities including Anglian Water and Thames Water have taken on so much debt that they might not be able to fund repairs caused by a major incident. This could mean customers facing significant bill increases or disruption in an emergency, the bank warned. Together, the companies' borrowings are close to their regulatory asset value. Ofwat has highlighted its commitment to ensure that if a company were to run into financial problems its customers would be protected.

SAUDI ARABIA: Veolia wins key contract
Veolia Water has announced that it has won a contract for water production and distribution and wastewater collection in the Saudi capital, Riyadh, in what it said was the first such contract in the kingdom to be awarded to a private operator. The six-year contract will have estimated total revenues of €40 million ($62.6 million), but may lead to further deals for Veolia in Saudi Arabia.

Loans and tenders

TAJIKISTAN: EBRD provides funds for water supply improvements
The EBRD is providing a new €1.5 million ($2.4 million) loan to further improve the water supply infrastructure and distribution network in Khujand, Tajikistan's second-largest city. The financing is part of an investment package that includes a €3.5 million ($5.5 million) grant from the Swiss government and a €1.4 million ($2.2 million) technical cooperation grant from Switzerland and the EBRD's Early Transition Countries Fund. The loan will improve Khujand's drinking water by installing new equipment – including more water meters to cover the whole city – that should reduce leakage and make the water supply more reliable. A stakeholder-participation programme will encourage greater public participation and ensure that poverty and subsistence issues are reflected in tariff reforms.

MEXICO: Bank approves wastewater project funding
The North American Development Bank (NADB) is providing $19 million to part pay for construction of a third wastewater treatment project in Mexicali, Baja California. The local water utility, the Comision Estatal de Servicios Publicos de Mexicali, is constructing the Mexicali IV wastewater collection system which will provide wastewater treatment to nine areas to the east of the city that are currently without such services. The project will also involve constructing sewerage, six collector sewers, three force mains and a number of pumping stations. Work will also double the capacity of the Las Arenitas wastewater treatment plant from 20 to 40 MGD (88 to 176MLD).

BRAZIL: State pledges to invest in total sewer coverage
The São Paulo state government in Brazil is to invest $21.4 million to provide complete sewer coverage in 14 cities, with the money funding a new treatment works in each of the locations. The funds will come from the Clean Water Program, which was created by the state government in 2005 to deal with cities of under 30,000 inhabitants that were not receiving services from state water utility Sabesp.

US: EPA provides water security pilot project grant to San Francisco
The US EPA has awarded an $8 million grant to the city of San Francisco to help it develop a drinking water contamination warning system. The pilot project, known as the Water Security Initiative, is intended to act as a model for other water utilities. The funds will allow the city's Public Utility Commission to undertake pilot monitoring, sampling, detection and installation of early warning systems. The SFPUC will provide $3 million in funding towards the project itself.

The potential impact of universal metering

The UK All-Party Parliamentary Water Group has published its 'Future of the UK water sector' report, predicting significant challenges ahead.

LIS STEDMAN reports.

The UK All-Party Parliamentary Water Group's (APWG) 'Future of the UK water sector report', published in April, marks a radical change in government thinking about the way water, and the water sector, should develop.

The report, as a commentary on the success of the most privatised water sector in the world, will be viewed with interest in countries where privatisation is beginning to develop. It starts by noting that 'This is a crucial time for the water sector in the UK. Faced with numerous challenges around affordability, efficiency, flooding, resource management and the regulatory system, it must now deal with them in order to lay the foundation for a sustainable future.'

The report authors, including APWG chair Elliot Morley, a long-term Environment Minister, took a participatory approach to its writing and worked closely with key stakeholders, also looking at examples of best practice in other sectors and countries.

Among the most radical of the proposals the report makes is to urge universal metering on a country that has always resisted the idea. When the current government first came to power in 1997, it laid down rules that allowed customers asking for meters to change their minds within the first year, inter alia, and its general tone has been a presumption against such a move on the basis of the difficulty of making metering work for vulnerable groups.

But the new proposals suggest that the Government should consider the 'role that the tax and benefits system could play in helping customers struggling to pay their water bills, as part of the current review into metering and charging.' One stumbling block to the use of benefits is that while funds are provided, they are paid at a flat rate whereas water bills vary widely depending on which part of the country the user lives in. How this could be resolved to ensure fairness is a critical issue.

Metering could also exacerbate the current considerable problem with non-payment of bills, which began to grow when the government outlawed prepayment meters and disconnections as means of ensuring payment.

The report also focuses on water efficiency, suggesting the development of water-efficient labelling and a tightening of existing regulations for new and existing housing stock, as well as the phasing out of some inefficient water products. They also propose a 'multi-utility' approach, and have considered potentially extending Carbon Emission Reduction Targets (CERTs) to the sector.

The inquiry also increased the group's existing concerns about the water sector's vulnerability to flooding, particularly from surface drainage. This has led it to call on government to immediately address issues around surface water drainage and clarify ownership and maintenance responsibilities. These have been major stumbling blocks for the take-up of sustainable drainage systems (SUDs, or BMPs) in England. Scotland, which early on made firm decisions on responsibilities, has seen far wider take-up of these systems.

On surface water management, the group recommends, in line with Sir Michael Pitt's recommendations in his interim review, that the Environment Agency should play a coordinating role, but it also stresses that there is an important role for local government in flood defence and management 'as they are best placed to deal with localised problems'.

Crucially for the water industry, the report notes 'We are not convinced that the current regulatory system is appropriate for making long-term investment decisions that ensure the quality of customer services, sustainability and innovation for the future.'

The report recommends splitting the current five-yearly price review format and creating a ten-year focus for capital expenditure. It notes: 'Both of these processes should then work within detailed 25 year strategic direction statements to provide a much-needed longer-term and sustainable approach to investment in the sector. We believe this addresses concerns from a range of stakeholders in the sector on the correct balance of investment, whilst ensuring that customers continue to be properly protected.'

These doubts echo a recent report from eminent utility economist Professor Dieter Helm, which criticised Ofwat's opposition to reform. His proposals also condemn what he sees as widespread financial engineering in the sector. In his view 'the original contract – that the balance sheets should be used to finance real capital investment – has been broken.'

Whether the APWG proposals would mend this problem remain to be seen – Professor Helm advocates a split cost of capital between debt and equity to end the financial engineering.

The economic regulator Ofwat is itself calling for changes, but sees competition as the solution rather than changes to the logic of the regulatory regime. In a new report, it has called for the privatised water companies to be exposed to 'step-by-step' competition, to the ultimate conclusion that eventually even domestic customers would be able to choose their supplier in the same way that they now choose power companies.

This suggestion is a response to widespread criticism of the failure of the current water supply licensing regime, which allows customers using over 50ML a year of water to choose their supplier. Despite around 2200 businesses being eligible under these criteria, not one has changed supplier, but there has been court activity over restrictive charging in at least one case.

Ofwat has also recommended separating the water industry's retail side from the water and wastewater treatment elements, with separate price regulation for the two sectors. This would create an industry vastly different to the one that exists in England and Wales today.

If these suggestions, along with the APWG report recommendations – and others, which include encouraging R&D investment in the sector, which has declined 60% since 2000 – then the privatised water utilities of England and Wales would be radically different entities when all of the changes were implemented.

However, implementing some of the proposals would create considerable issues – separating out the retail element of the private water businesses, for instance, would require heavy government intervention and could reduce investor confidence in the sector. The government will not have forgotten the ongoing repercussions of taking the rail network entity back into public ownership without compensating shareholders and investors will, with this in mind, be nervous about further interference in private sector frameworks.

Nevertheless, the report is a key input into what is becoming a serious and widespread discussion of the future shape and direction of the privatised utilities of England and Wales. With further reports due out this year, there are clear messages about the need for change that will provide substantial food for thought for countries with privatised – or considering privatising – water utilities. ●

Benchmarking in the water industry: a mature practice?

Benchmarking, increasing efficiency through monitoring the performance of sector providers and adopting best practice has become increasingly widespread. **ENRIQUE CABRERA JR.** gives an overview of the benchmarking concepts and their use in the water industry.

Since the word benchmarking started to appear in the water industry in the mid 1990s, the development of the tool has been tremendous. However, only in the past few years has the practice been extended on a global basis. In this issue you will find a good collection of ongoing benchmarking projects around the world. They are success stories in which the investment in time and resources is paying back to those that have taken the risks of undertaking a benchmarking effort.

And yet, despite the many initiatives which can be found around the world, the abundant literature published on the topic and the success stories that accompany these projects, the methodologies underlying this single term 'benchmarking' are very diverse and often subject to significant shortcomings.

Without a doubt, in the following years the challenge will be to develop a common understanding of what benchmarking is and which are the key elements that are necessary in the development of a successful benchmarking project. The IWA Benchmarking Task Group may play an important role and achieve similar results to the ones obtained in the field of performance indicators.

One word, two concepts

Benchmarking was born in 1981 (Flower, 1993). Its birthplace, Xerox, was far away from the quiet business (in terms of direct competitors) of distributing water. After all, water services are monopolistic by nature (on a local level) and are not naturally driven to increase efficiency and achieve best practices. Xerox benchmarking consisted in learning from the best in class and adapting best practices to achieve superior performance.

By the late 1980s, with the privatization of the water sector in England and Wales, the comparison of performance measures became a tool to create competition in a world without competitors. The techniques developed during that period ended up being named 'benchmarking' as well.

Trying to avoid confusion between a well established term in other industries (Camp, 1989) and the recently developed techniques for the water sector, a report published by AwwaRF and WEF coined two different terms:

- **Metric benchmarking**, for the comparison of numerical performance indicators of different utilities, and
- **Process benchmarking** to designate what in other industries was simply known as benchmarking: the identification and adaptation of best practices to improve performance.

Despite the fact that both techniques are very different (in objectives, methodology and results), the common wording has proven to bring enormous confusion to the industry. And so, to the non-initiated, benchmarking can be either one, and often they are both amalgamated into a single tool of diffuse characteristics.

The truth is that metric benchmarking is a comparison tool that provides information and is often used by regulators to increase competition. It relies on the collection of performance data, feeding a performance indicators system that enables the side by side comparison of utilities. The basic output of metric benchmarking is information: who is performing better (more efficiently) and in which areas.

On the other hand, process benchmarking is an improvement tool. It is aimed to change internal processes within the utility in order to improve performance. Although it usually involves water utilities, it can also include partners from other sectors that share similar processes. Process benchmarking requires the use of metric measures in order to determine who the best in class is, but the metrics are means to an end and not the purpose of the technique itself (contrary to metric benchmarking).

The papers presented in this issue (as it could not be otherwise) make use of the word benchmarking to describe both metric and process projects. They are a true reflection of the current state of the water industry, with most efforts being attempts at metric benchmarking (in different degrees of complexity) and with two examples (the North European and Dutch efforts) that have developed into forms of process benchmarking.

Metric benchmarking: the art of comparing apples and pears

Metric benchmarking has seen a spectacular development in the past decade. From the early efforts by Ofwat (the economic regulator of England and Wales) and the World Bank (see the International Benchmarking Network for the Water and Wastewater Utilities (IBNET) paper in this issue) the number of projects, both on national and international bases, has grown exponentially.

Most metric benchmarking efforts can be classified into four main groups depending on the promoters of the projects:

- **Regulators.** The water industry is witnessing an increasing presence of regulators in many parts of the world. Regardless of the nature and intensity of the regulation, the preferred tool for most of these organisms is metric benchmarking.
- **Funding agencies.** Most notably the World Bank through IBNET, but not limited to it. Development banks and multilateral organizations are encouraging metric benchmarking as a source for efficiency in the water sector, especially in developing countries.
- **National Associations.** Metric benchmarking is being used as a tool not only to promote efficiency within national schemes, but also to prove good management and continuous improvement to the general public and governments

considering further regulation of the local industry.
- **Large companies**. Scarcely publicized, but nevertheless existent, companies running a considerable number of utilities, nationally or internationally, are using performance indicators to compare and improve performances in their systems.

All these metric benchmarking projects (and any others that may not fit in these categories) face a major challenge. The fact that regardless of sharing a common business and perhaps many other circumstances, the projects often end up comparing very different systems. The most repeated phrase in any benchmarking project is we cannot be compared, we are different. And in all fairness, it is a true statement.

Any former participant in a benchmarking project knows that differences in context will, as a matter of fact, turn any comparison into a mission impossible. Whether it is the source of water (surface or underground), the density of connections, the seasonal population, the network age, the tariffs or the local costs of labour, comparing performances will hardly produce a final and conclusive answer. That is why metric benchmarking is the art of comparing apples and pears. This should not be taken to mean that metric benchmarking cannot provide extremely valuable information.

Quite obviously, these problems appear only at the analysis stage of metric benchmarking. Until then, indicators have been defined, agreed upon, data have been collected and tables and charts have been created. However, true metric benchmarking only takes place if a performance analysis takes place. Anything else may be described as a collection of statistics on performance, with a more or less elaborated framework.

This final stage, identified as indispensable by the IWA Benchmarking Task Group, is often not present in many of the projects quoted as benchmarking efforts and which, in the group's opinion, fail to qualify as such. Without a comprehensive analysis, metric benchmarking fails to deliver anything but additional questions, and does not provide any real answers.

The absence of performance analysis does not imply that those efforts are not useful. The simple definition of indicators, collection of data and public comparison of performance figures, triggers several internal positive mechanisms in utilities that can lead to better practices (including, but not limited to, improvement of information systems, corporate awareness of search for efficiency and increased drive for improvement).

However, if the questions '*who is better?*' and '*why*' are not asked, the project will not provide any final answers. As a natural consequence of the previous questions, context will become a key issue during the analysis stage – a concept already highlighted by the IWA proposal of performance indicators (Alegre et al., 2006) where context information is formally defined (context being any system characteristics not modifiable by management decisions on the short and medium term).

And this is precisely one of the main improvements that could be made in many benchmarking efforts in the world. The inclusion of relevant context information to be reported by the participants could enhance the analysis stage of many projects and give further meaning to those limited to collecting performance data.

Ranking utilities – qualitative vs. quantitative analysis

The ultimate objective of metric benchmarking is to find out who is performing best. Regulators may turn this competition into a powerful tool to encourage efficiency by, for instance, linking tariff changes to the results of benchmarking efforts. This however means that decisions with important economic repercussions for the operators rely on an imperfect method (the one comparing apples and pears).

Regulators often resort then to mathematics and statistics. Methods like data envelopment analysis and stochastic frontier analysis allow regulators to take away any 'human' appraisal of performance. These tools are able to use the information provided by the indicators and determine the efficiency of a utility compared to the others. While this makes the task of the regulator easier (and apparently less biased) the truth is that these methods still need human participation (in defining, for instance, what are the inputs and the outputs) and, additionally, rely solely on indicator values for the analysis. The mathematical and statistical nature of these methods also implies that the validity of the results will strongly depend on the quality of the data. A deep knowledge of the different methods, their strengths and weaknesses, is needed to make use of this alternative.

	Utility A	Utility B
Real losses (litres/connection/day)	120	160
Accuracy	20-50 %	5-20 %
Reliability	** (Fairly reliable data source)	*** (Highly reliable data source: data based on sound records, procedures, investigations or analyses that are properly documented and recognised as the best available assessment methods.)

Table 1: Comparison of leakage indicators including confidence grade

The other alternative favours the human factor. Experience and knowledge of the systems come into play when the values of the indicators need to be assessed by themselves, taking into account context and other explanatory factors. This form of evaluation is more prone to subjectivity, but it is also far more transparent and flexible.

In any case, both forms of analysis require additional information on data quality to be included - information which is rarely found in the metric benchmarking efforts taking place around the world. Most utilities joining metric benchmarking projects soon find out that their data are not so easily accessible, accurate or reliable, but few initiatives require that participants report on the quality of the submitted data.

The absence of confidence grades (as defined by IWA in Alegre, 2006) or any other information on the quality of data represents an important handicap during the analysis stage. This is quite obvious for quantitative methods, where data quality needs to be good to avoid garbage-in / garbage-out models. Without paying attention to data quality, it will be difficult to guarantee that all utilities report indicators of similar pedigree. Under those circumstances, how reliable are the conclusions of the analysis?

Similar problems will appear when comparing indicators in a qualitative way. For instance, which of the two utilities portrayed in Table 1 is performing better regarding leakage? Surely, the leakage indicator (real losses /1000 connections) is better for utility A. However, the accuracy (uncertainty

associated to the figure) and the reliability (for instance the amount of estimations that went into getting the figure) of the indicator, are significantly worse. Without such information, the analysis based solely on the indicator figure would have probably been completely different.

Natural evolution – process benchmarking

Evolution takes place in nature, but also in the water industry. Some of the most veteran benchmarking projects, that started as metric, have slowly turned into process efforts. There are several reasons for this change.

Sometimes the projects get stagnated. With the same participants year after year, each new round provides less and less valuable information. Leaders usually remain ahead of the pack and once they realize they are best in class, they need something else to drive their improvement.

Additionally, once differences are identified and the results are solid enough, it is only natural to ask the '*why*?' question. Participants start collaborations in order to determine which are the factors that create differences in performance. Process benchmarking is born.

The feedback from these process benchmarking efforts could be quite discouraging. Participants are required to use a significant amount of resources (human and economic). First timers often find it difficult to deliver everything that is required from them. Results are sometimes disappointing for the ego. And yet, most participants can quantify important improvements in their processes and repeat year after year.

Experience is a key factor in these projects, and the specific methodologies (often brought in by external consultants) although similar in principle, may influence the degree of success of the project. A clear example of such project can be found in the Northern European Benchmarking featured in this issue, a project currently supported by IWA.

The road ahead

The experiences presented in this issue are a clear example of the increasing success of both metric and process benchmarking as useful techniques to achieve greater efficiency in the water industry. From China to Tanzania, from Moldova to Brazil, utilities around the world with very different motivations and backgrounds have joined the benchmarking club.

Additionally, the efforts by the World Bank through IBNET to provide motivation and drive for improvement, and the increasing presence of IWA supporting benchmarking initiatives, are a clear sign that we will be hearing many new benchmarking stories in the near future.

Perhaps the challenge in the following years will be to reduce the steep learning curve that newcomers still face today in their first attempts at benchmarking – a challenge that requires a common terminology and further dissemination of the success stories already taking place around the world. Two objectives that I am sure this issue will help to achieve. ●

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Singapore International Water Week Convention
23-27 June 2008, Singapore
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SIWW Water Convention Secretariat
Tel: +65 6731 3362
Web: www.siww.com.sg / waterconvention/index.php

Water Distribution System Analysis
17-20 August 2008, Kruger National Park, South Africa
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Web: www.uj.ac.za/wdsa2008

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Email: secretariat.www@siwi.org
Web: www.worldwaterweek.org

CIWEM: Integrated Urban Drainage Management Policy
Autumn 2008, London, UK
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6th IWA World Water Congress & Exhibition
7-12 September 2008, Vienna, Austria
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2nd IWA Utilities Conference: European Conference of Water and Sanitation Services - Customer Relations and Citizen Participation
9-11 December 2008, Paris, France
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Web: www.astee.org/iwa2008

Water Loss 2009
29 April 2009, Cape Town, South Africa
Email: waterloss2009@randwater.co.za
Web: www.waterloss2009.com

IBNET – a global database of the water sector's performance

Benchmarking is becoming an increasingly valuable tool in the measurement of water supply and sanitation coverage with regards to meeting Millennium Development Goals. **CAROLINE VAN DEN BERG** and **ALEXANDER DANILENKO** discuss IBNET, the International Benchmarking Network for the Water and Wastewater Utilities, and its role in measuring sector performance.

The water and sanitation sector is facing increasing demands for the measurement of the performance of the delivery of water supply and sanitation services. This is driven in part by the interest of the global community in achieving the Millennium Development Goal of reducing the gap in water supply and sanitation coverage by half between 2000 and 2015. The demand for performance measurement also reflects an increased focus on improved transparency and governance to better monitor the impact of sector interventions, and to improve policy advice and project design and implementation. As a result, performance assessment of water and sewerage utilities has increasingly become a key instrument in the urban water sector. Not only can performance assessment contribute to improved monitoring, but the information collected can also aid in the design of sector strategies, policies and planning.

The International Benchmarking Network for the Water and Wastewater Utilities (IBNET), funded by the Department for International Development (DfID) of the United Kingdom and managed by the World Bank, aims to reduce the information gaps in the sector by providing tools and methods to measure sector performance. IBNET also provides public access to utility performance indicators that can act as benchmarks for utilities and other sector professionals interested in improving performance in the water and sanitation sector.

What is IBNET?

IBNET provides a set of tools for water and sanitation utilities to measure their performance both against their past performance and against similar utilities at the national, regional and global levels.

IBNET consists of three major tools. The first is the IBNET data collection toolkit, which can be downloaded from the IBNET website at www.ib-net.org and which is essentially an Excel spreadsheet with a set of data to be completed and instructions as to which precise data to enter. The second tool is a continuously renewable database of water and sewerage utilities' performance. This database provides utilities and other sector stakeholders the opportunity to search for data in different formats and also allows for simple benchmarking of utility data. The benchmarking tool enables the utility to compare itself to other utilities that share similar characteristics (e.g. size, factors related to location, and management structure). A third tool provides data on participating agencies that can help organizations interested in measuring utility performance to contact neighboring utilities as well as other organizations, and as such build local networks for performance assessment and benchmarking.

IBNET has a number of distinctive features. The first is that participation is voluntary. As a result, organizations that contribute to IBNET are very diverse. They include for instance regulatory associations (such as the Association of Water and Sanitation Regulatory Entities of the Americas (ADERASA)), national water associations, government departments and agencies involved in the monitoring of urban water supply and sewerage utilities, and more recently, individual utilities.

A second feature of IBNET is that IBNET itself does not collect data. It works instead with many different organizations to set up mechanisms for these organizations to conduct the data collection. From the start IBNET's strategy has been to use a highly decentralized approach. Those closest to the utilities and knowledgeable about local conditions are best suited to compile data and assess utilities' performance. IBNET's role is to provide instruments to support this process, such as the IBNET Toolkit. It may also organize workshops to assist the local agencies in training staff in data collection and analysis, and it provides feedback once the data is collected. In its feedback, IBNET checks the quality of the data collected to ensure its internal consistency, and helps participants to analyze the data. Experience has shown that when the data collection process has been repeated several times, this technical assistance becomes increasingly redundant, and organizations can

undertake their data collection on their own.

A third feature of IBNET that deserves mention and which is rather unique among agencies involved in utility benchmarking, is its focus on the development of time-series data. Without time series data trends in utility performance and the impact of water and sanitation policies are hard to detect. Effective development of time-series data requires the rigorous use of a standardized data set and indicators to ensure that the data remain comparable over time, as well as frequent updating of the data. Most of the data are updated bi-annually. With performance assessment and benchmarking gaining more prominence as tools in regulating and monitoring the sector, it has become easier to obtain data on an annual basis – especially in those countries where performance assessment is increasingly institutionalized. Currently, more than 50 percent of utilities in IBNET have at least four years of data results, and a large percentage of utilities represented in the IBNET database have data series of between five to ten years. This has made it possible for the first time to undertake time-series analysis instead of being limited to cross-section analysis of performance.

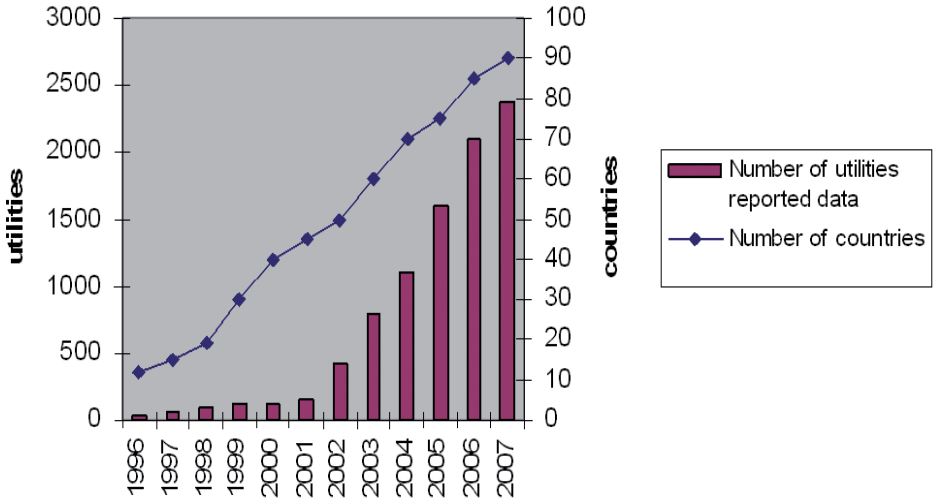

Figure 1: IBNET's development

Development of IBNET

IBNET is the result of a decade-long effort by the World Bank that started in the early 1990s. The process began as World Bank staff recognized the need for operational indicators. Such indicators could help sector staff and practitioners evaluate utility and sector performance to monitor what impact investments would have on this performance. World Bank staff also found that the benchmarks used in developed countries were at times quite useful, but often poorly adapted to the context of developing countries. The water sector in developing countries was characterized by immature systems with relatively low water supply and an even lower level of sewerage collection and treatment coverage. Developing countries also faced the need to provide services to large poor populations with major consequences for the financial viability of utilities. Thus there was clearly a need in both industrialized and developing countries to start to collect and disseminate performance indicators of water and sewerage utilities.

Although the concept of building a global database based on a standardized set of data and performance indicators appears straightforward, there were many challenges.

A first challenge was to define and adhere to a standard that would provide data that could be compared over time and space. Standardization of data and performance indicators is a process that requires a great deal of upfront coordination and decision-making. Decisions had to be made about which data was important and how to collect it, with little room for trial and error. Errors would render previously collected data invalid and delay the establishment of a time-series based database. The International Water Association (IWA) was instrumental in this context. The IWA Toolkit served as a starting point for setting up the IBNET Toolkit with the aim to ensure that the data could be collected from many different utilities in very different country contexts and operating environments across the world. Standardization clearly has major advantages regarding the comparability of data. It also reduces flexibility, however, as data inputs and definitions cannot change very easily, as changes can lead to breaks in the time series. Standardization was therefore the most important step in the set-up of IBNET and also the most time consuming.

A second challenge relates to the public character of the data. Although most water companies are public entities that are required to disclose basic information to the general public through annual reports, at times it was necessary to overcome resistance to disclosing performance indicators. To overcome that resistance, the IBNET team approached the utility managers, water utility associations and water regulatory authorities to develop measures to protect sensitive information from disclosure, while giving the public access to a large set of performance indicators of the water and wastewater providers participating in IBNET.

A third challenge relates to data quality. Quality is especially an issue for operational data, population data (which is not collected by utilities), and, to a lesser extent, financial data. The IBNET Toolkit provides checks and balances and helps the data collectors to find common errors in the data inputs, as does the database itself. In addition, the IBNET team developed a special data quality questionnaire that is used by the utilities while compiling the data. The data quality indicators range from 'accurate' to 'estimate'. The information on data quality is submitted to the IBNET team during the data collection process, and the IBNET team suggests remedies for incomplete or inconsistent information and determines whether data are to be entered in the database. While this process is somewhat contrary to IBNET's goal of making participation as simple as possible, it provides an important incentive to improve data quality. The experience has shown that data quality tends to improve over time as data is collected more often.

A fourth challenge relates to data externalities. In telecommunications, the value of the service increases when more people use the service. Mobile phones are only useful if a large enough number of people have them. The same applies for data. A database like IBNET only has value when it reaches a certain size and scope. Yet, gaining that momentum requires that participants be convinced of the benefits, which might be limited in the short term. Given the current size of the database, it is hoped that there will be a greater incentive for those utilities and organizations not yet participating to join the process.

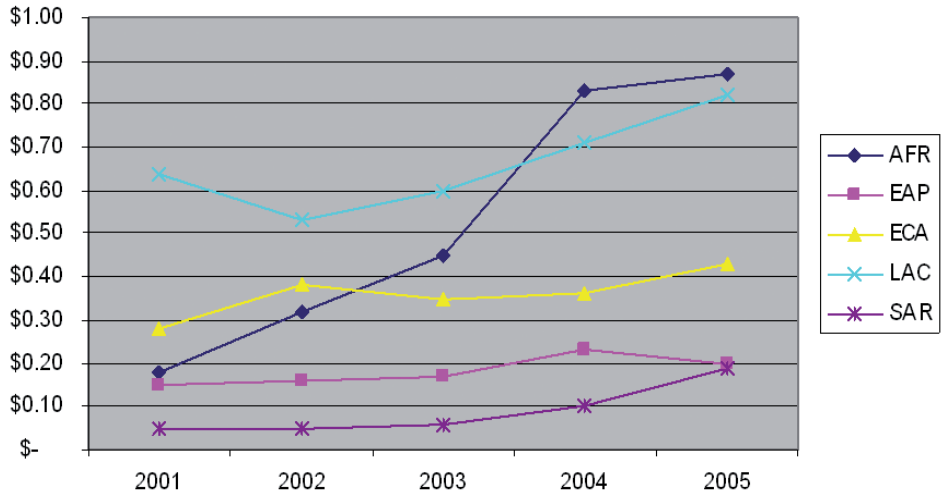

Figure 2: Water revenue per m³ in current US$

Results thus far

Since its inception in the 1990s, IBNET has become the largest public database, providing utilities and others interested in the water and sanitation sector with performance data from nearly 2400 utilities in 95 countries. Over 60 percent of the utilities presented in the database have more than four entries of performance information in IBNET making it increasingly possible to look into performance trends at the utility and sector levels.

The strong drive for data collection came in 2004 when, with funding from DfID, technical assistance agreements were concluded with many different organizations across the world to determine whether it would be possible to collect three to five years of data. Since then the number of utilities has increased from about 750 to about 2400.

As a result, the number of data observations on the IBNET website has grown exponentially. Currently, the database has almost 300,000 data observations, which are not open to the public, compared with 345 in 1997. On the basis of these 300,000 data observations, the IBNET database calculates a much larger set of performance indicators that are available to the general public on the www.ib-net.org website.

IBNET, despite being a very specialized website, attracts a large number of users. Every month, 30,000 practitioners, researchers and donors log into the IBNET website, work with its database, and download utilities' performance data. IBNET data are also starting to be used more extensively by researchers and sector professionals, as is reflected in reports and working papers.

Examples of the use of IBNET data

IBNET has value at the utility level, but is also useful for observing regional and global trends in sector performance.

Analysis of water supply coverage shows that this indicator is consistently improving despite rapid urban growth. The most rapid improvement of coverage took place in Asia, whereas service coverage in Latin America (where most of the population already lives in urban areas) has remained more or less flat.

Water revenue has also increased rapidly, partly as a result of rapid urban growth, but also because water has become more expensive. Water revenue per cubic meter has increased rapidly, especially in Africa and Latin America, and to a much lesser extent in Asia and in Eastern Europe and Central Asia. The average revenue for the utilities in the IBNET database increased from $0.45 in 2000 to about $0.90 in 2006 in current US dollars.

Water production costs, however, are also increasing. The electricity tariff, one of the key components of the cost structure of the water utilities, has been growing fast, especially in Eastern Europe and Central Asia, because of deregulation of the electricity sector. The trend of increasing electricity tariffs is likely to continue with energy prices rising rapidly. In many cases, the operating cost coverage ratio has been declining, despite the increase in water tariffs. This is a major issue as many utilities are barely able to cover their operating and maintenance costs. So even though in the short-term they are able to provide water supply services, their long-term viability is much less secure.

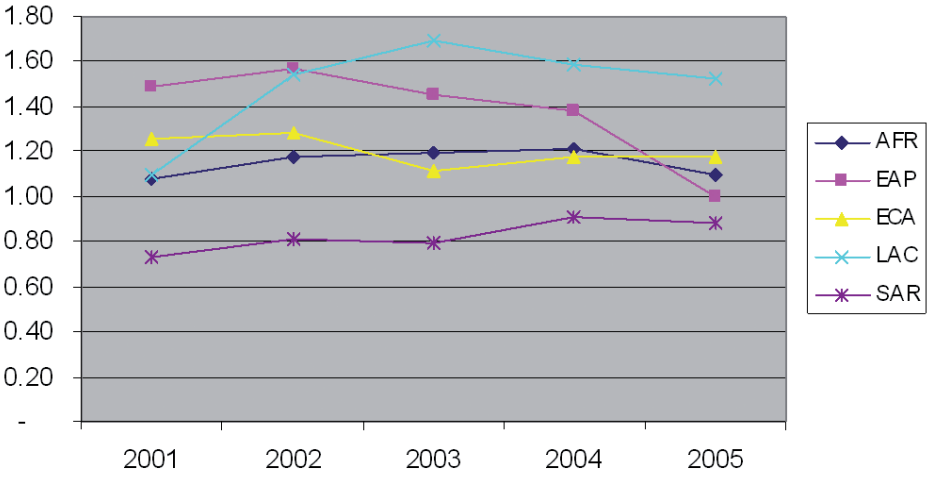

Figure 3: Cost recovery rate (total operational revenue over costs)

Future plans

Consistent funding and efforts are needed to maintain a global database that is in the public domain. Over the next four years, we will continue to provide technical assistance to utilities and other organizations that are interested in implementing performance benchmarking, but lack the capacity to do so. With the increase in interest in benchmarking, the requests for technical assistance have multiplied.

IBNET is actively cooperating with the IWA to expand the IBNET network and methodology. Although IBNET has been successful in expanding participation in developing countries, it has not yet been successful in expanding participation to include developed countries. Participation of utilities in developed countries could provide important benchmarks for high performing utilities in poorer countries. IBNET is also interested in further supporting performance assessments on the utility level. Once utilities start to conduct performance assessments, their appetite for information tends to increase, and they start developing additional sets of indicators that help to fine-tune their performance further. IBNET is interested in developing modules to help utilities to incorporate this information in their assessments in a way that makes it comparable across utilities, while also

providing information about the relative costs and benefits of introducing such modules in a logical sequence.

To improve its efficiency and effectiveness IBNET is also exploring the possibility of using regional hubs as part of its strategy. These could include regional organizations and agencies that are currently involved in performance benchmarking, most notably ADERASA in Latin America, the South East Asian Water Utilities Network (SEAWUN) and the Africa Water Operators Partnership. Other regions, however, such as South Asia, the Middle East and Eastern Europe and Central Asia, lack regional agencies involved in benchmarking. The Asian Development Bank's initiatives for utility performance improvement may, however, encourage the development of more regional agencies in Asia.

Conclusions

Through a concerted effort, IBNET has succeeded in increasing the use of performance assessments in the water and sanitation sector, and as a result has increased the availability of performance indicators with which utilities can compare their performance both over time and in comparison with other, similar utilities.

Such comparisons can provide utilities with incentives to improve their performance in an environment where utilities are increasingly faced with major challenges. These challenges include an increase in input prices, rapid urbanization in many countries across the world, and the need to adapt to climate change. Utilities at the same time face the need to increase water supply and sewerage coverage for those that still lack access to safe water supplies and appropriate sanitation services.

It is clear from the history of IBNET that developing information systems that measure the performance of water and sewerage utilities, or any information system for that matter, is a process that takes time and that requires consistent funding and dedication to ensure that it maintains its relevance. ●

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North European Benchmarking Co-operation: taking the next step on the learning curve

Extending their national benchmarking programmes, Scandanavia and the Netherlands formed the North European Benchmarking Co-operation. **PETER DANE** and **THEO SCHMITZ** look at the use of the NEBC in encouranging continued improvement across water sectors.

In 2004, the Scandinavian and Dutch national water associations and several water utilities decided to start an international benchmarking process alongside their existing national programmes. The North European Benchmarking Co-operation (NEBC) has been set up as an umbrella organization. In 2006 the NEBC conducted its first pilot scheme for an international water benchmark. This pilot scheme led to a second pilot scheme with a more extended scope. At the end of 2007, 30 drinking- and wastewater utilities from 10 different European countries had taken part in the International Benchmark 2006. Based on the International Water Association (IWA) performance indicators, a three-level benchmarking model has been developed to compare utilities' performances at different levels of detail.

The model focuses on five key performance areas: water quality, reliability, service quality, sustainability, and finance and efficiency. Because of its structure, NEBC's benchmarking methodology is especially useful for utilities in different stages of development and for facilitating Water Operator Partnerships, partnerships built on a not-for-profit basis, between public water and sanitation operators themselves, or between a public operator and any other interested party, for the improvement of the public sector's performance.

Rank Xerox

Benchmarking is an instrument first introduced decades ago, which has proven its worth. It was first put into practice in the 1970s by photocopier manufacturer Rank Xerox. This company noticed the sales of photocopiers trailed those of Japanese manufacturers. The Japanese not only made higher quality machines but also had more efficient production methods. At that time Rank Xerox introduced the principle of benchmarking to learn ways to run business processes more efficiently and to stand up better to competition from Japan.

Learning curve

In many countries, regional or national benchmarking schemes have been established in the past decade. These benchmarking initiatives can substantially improve the performance of water utilities. However, it is important for these programmes to be oriented toward continual improvement. In general, when national programmes have been in operation for a certain amount of time, the law of diminishing returns tends to set in. This will of course depend on the number of participants, the extent of the programme, the level of detail and the extent to which participants seek to identify and implement best practices.

Looking over the border can provide new perspectives: the original reference group can be enlarged, and, in some cases, utilities across the border may provide a better means for comparison than utilities in the home country. This is especially true for larger utilities or multi-utility companies. International benchmarking enables utilities to take the next step on the learning curve by finding new peers, setting new targets, and identifying new best practices and innovative solutions for management and operations.

NEBC's benchmarking methodology

NEBC's international benchmarking programme includes both water and wastewater utilities. Drinking water and wastewater services are closely related and form the so called 'Water Chain System'. Six main activities can be distinguished (see Figure 1):

- abstraction of raw water;
- treatment of raw water;
- distribution of drinking water;
- collection of wastewater;
- transport of wastewater;
- treatment of wastewater.

In its first pilot scheme in 2006, NEBC used the Dutch benchmarking methodology for drinking water. Although this methodology thoroughly investigates performance areas and business processes, the NEBC partners thought it was too extensive and complex for first time users. For this reason, an entirely new methodology has been developed for the second pilot scheme based on IWA's Performance Indicators System. The new benchmarking methodology suits both large and small utilities in the areas of both water and wastewater.

Three level model

Essentially, water utilities carry out the same kinds of activities, but scale and operating environments can differ greatly. Therefore, a benchmarking model has been developed with three participation levels: basic, metric and advanced. These levels were especially selected to allow for the participation of smaller, less experienced utilities with lower capacities at a level that is appropriate to their development stage. Figure 2 shows a diagram of the NEBC benchmarking model. Next to each participation level, there is a list of the key performance areas, which constitute the basis for comparison among utilities.

Basic level

At the Basic level general characteristics of the utility are collected. The aim is to characterize the water utility and to describe its operating environment.

Metric level

At the Metric level, water utilities are compared by showing (key) performance indicators for the different performance areas. These indicators give utilities a first insight into their performance in certain areas, over time and in comparison with other utilities. Metric benchmarking helps to identify areas for improvement. When published, the performance indicators also contribute to improved transparency.

Advanced level

At the Advanced level, water utilities are compared by analyzing their performance in the different areas in greater detail. Costs are compared at the process level based on the business process models developed for water and wastewater activities. At the process level utilities learn the most from benchmarking in their quest for operational excellence. When comparing costs at the process level or even at the sub-process level, one can identify performance gaps and areas for improvement. The leading utilities and processes can be determined and knowledge exchanged. This level is also where overall performance can be assessed according to the scores in the different performance areas.

The NEBC partners encourage utilities to participate at the highest possible level, depending on the availability of data and their ambitions. Obviously, the more detailed the analysis, the more the utility benefits.

At each level and in each performance area, performance indicators are defined, which are based on IWA's Performance Indicators System to the extent possible. Although indicators can still be improved further, the NEBC partners consider the IWA system as the standard, since it has been applied in many programmes and successfully tested in practice.

The benchmarking process

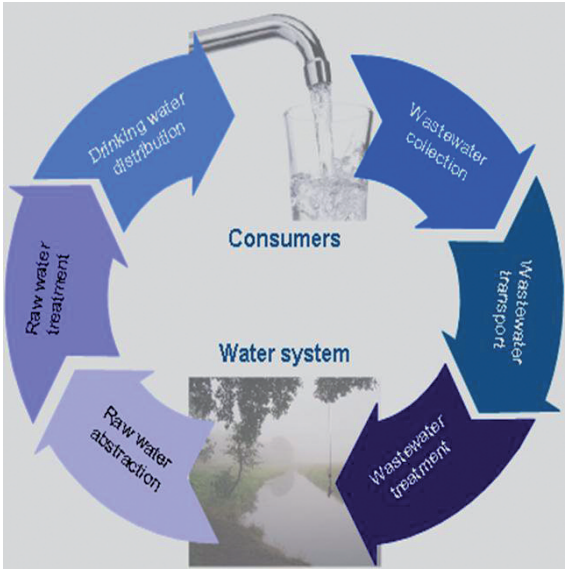
NEBC's international benchmarking process consists of seven phases. In the preparation phase, the new participants are informed about the time lines, organization and possible changes to the benchmarking methodology.

In the *data collection phase*, the most important work takes place. Participants collect the required data and can obtain assistance from the NEBC Coordinator if necessary. The collected data are entered into the project website, login.waterbenchmark.org, by the utilities themselves. The participants can adjust or add to the data at any time.

In the *analysis phase*, the submitted data is analyzed. Participants are contacted in case of sharp variations and other possible inconsistencies for comments and/or corrections. The data are thoroughly reviewed by the NEBC Coordinator. Such review and inspection is essential for a reliable and unbiased dataset and for the subsequent comparisons.

In the *reporting phase,* a series of reports are prepared on the basis of the data supplied, containing the most important performance indicators. Figure 3 provides an example of a report for one performance indicator. The performance indicator provides the company with average values in the sector and shows the company's performance compared to that of its peers. The participants may also view results directly online and download data and reports for any required performance indicator from the website. Thus, utilities are able to determine their position and performance gaps for the different performance areas.

Figure 1: The water chain system



NEBC: exchanging best practices on management and operations

The North European Benchmarking Cooperation (NEBC) was founded in 2005 by the national water associations DANVA (Denmark), FIWA (Finland), Norsk Vann (Norway), Svenskt Vatten (Sweden) and Vewin (The Netherlands) and the utilities Helsingin Vesi, Københavns Energi, Odense Vandselskab, Oslo kommune VAV and Stockholm Vatten (related to the Scandinavian 6-Cities Group). The collaboration aims to assist water utilities in their continual efforts to improve efficiency and transparency through 1) exchanging knowledge in relation to benchmarking, 2) developing an international benchmarking programme and 3) exchanging best practices of management and operations.

The first joint activity of the NEBC partners was a pilot scheme for drinking water (2006), comparing the costs of drinking water of fifteen utilities from three countries, using the Vewin benchmarking model. The second pilot scheme included 30 water and wastewater utilities from 10 different European countries and aimed to compare a large number of performance areas and business processes. The three-level benchmarking model that is applied is based on the Performance Indicators System of the International Water Association (IWA).

IWA supports NEBC's benchmarking activities. More information is available at NEBC's website: www.waterbenchmark.org

Workshops

In the *best practices phase,* utility representatives meet each other in workshops and during site visits and bilateral visits. In this phase, the results of the comparisons are discussed, best practices are identified and shared, and ideas are developed for utility action plans. Within a short period of time, participants are encouraged to interact as much as possible. This is the most important phase of the benchmarking process.

In the *evaluation phase,* the participants and team of coordinators conduct an evaluation to identify areas for improvement relating to the benchmarking process, methodology, reports, online feedback, tools, exchange of best practices and other general or practical matters.

Finally, the benchmarking cycle ends with the *closing down phase*. Then, the continuous plan-do-check-act cycle to improve performance begins again.

The way forward

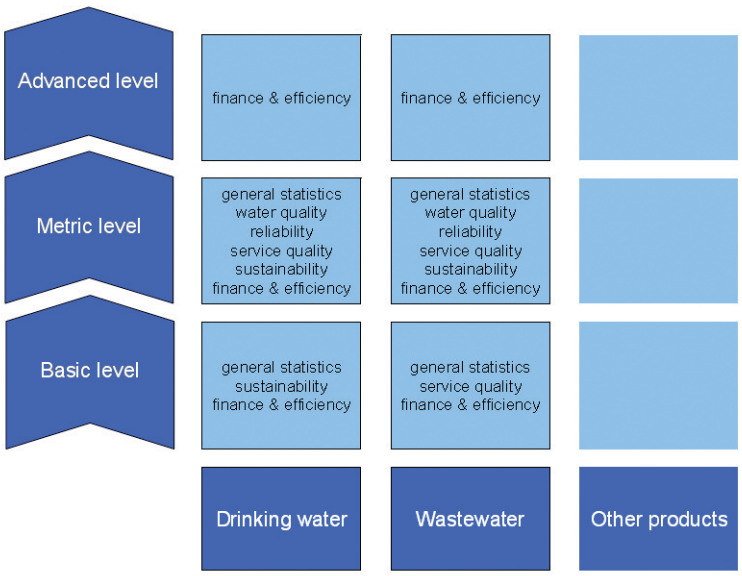
NEBC's second international benchmarking pilot scheme was completed in April 2008. Based on the positive results and feedback from the participants, the NEBC partners intend to proceed with the international benchmarking activities. A number of issues must be addressed for the program to become a definitive standard for the drinking water sector in Europe. These include expanding the number of participants, bringing forward the starting date of the benchmarking round in the calendar year, and further developing the concept of the best practices event as a platform for exchanging knowledge among water supply companies.

Further increasing the number of participants is necessary to make performance comparisons even more relevant. More participants will allow a utility to benefit further from comparisons with its peers not only with regard to the size or type of utility, but also in terms of location, e.g. whether the company is operating in an urban or rural area.

To enable the participating utilities to use the benchmarking results efficiently as part of their management information, it would be appropriate to start the benchmarking cycle right after balancing the books for a calendar year and to finalize it before the end of the year. For that reason the International Benchmark 2007 will be carried out and completed in 2008.

The best practices event is of great importance to the participating utilities. It gives them the opportunity to explore the results in greater depth and exchange best practices during workshops. At the best practices event of the second pilot scheme, utilities made useful contacts and arrangements to assist one another in further optimizing the processes. The concept of a best practices workshop has proved successful and will remain a prominent part of the benchmarking programme in years to come.

Figure 2: The NEBC benchmarking model



Conclusion

NEBC's international benchmarking project is a successful initiative, which complements national programmes and will be further perfected as a European standard in years to come. Interested utilities can contact NEBC via info@waterbenchmark.org. Further information is available at www.waterbenchmark.org. ●

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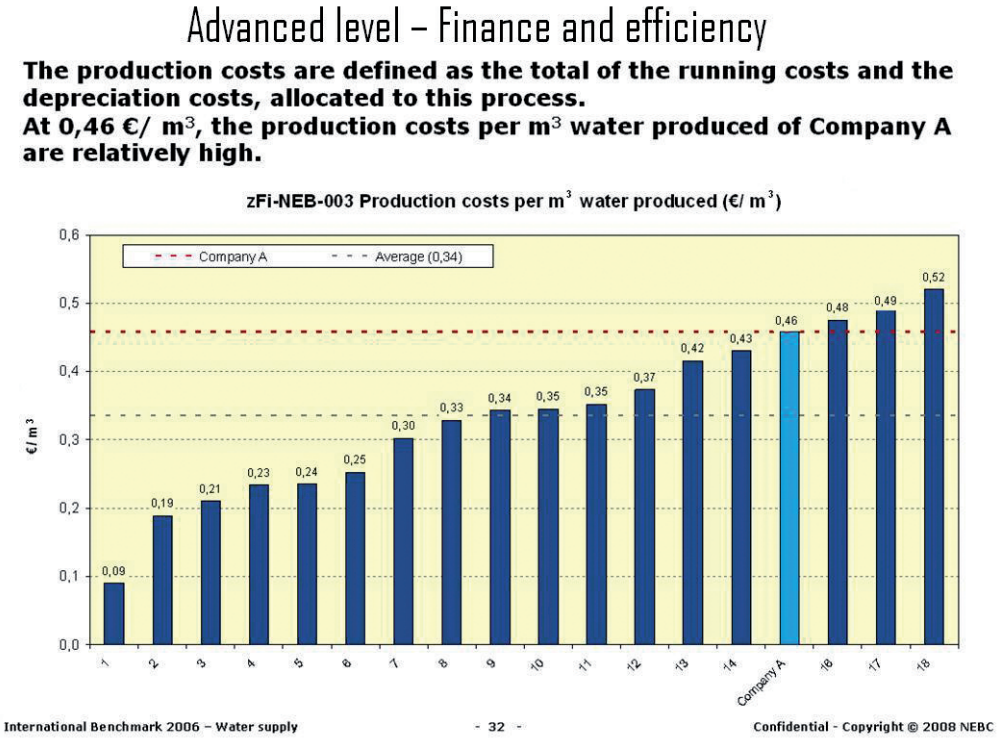
Figure 3: Example of a business report for one of the performance indicators



The evolution of monitoring in the water supply, sewerage and solid waste sectors in Brazil

As part of its Growth Acceleration Programme, the National Sanitation Information System (SNIS) has built a database on water and solid waste sector performance. **NYEDJA DA SILVA MARINHO** explains the development of the SNIS and its use in improving Brazil's water supply and sewerage systems.

Brazil is a federation consisting of 26 states and 5564 municipalities, of which almost 90 percent have no more than 50,000 inhabitants, whereas only 267 municipalities have populations of more than 100,000. In Brazil a little more than 80 percent of the population (or just over 150 million people) live in urban areas. This concentration of the population in urban areas and the fact that the majority of municipalities are small has a major impact on the design and monitoring of policies, especially in the delivery of public services, including the provision of water supply, sewerage services and solid waste management.

The delivery of water and wastewater-related services (water supply, sewerage, solid waste and drainage) is governed by the newly approved Law 11,445 of January 2007. This law lays out the basic rules for planning, service provision, regulation, supervising, social control and monitoring among the different levels of government: the federal government, the state governments, the Federal District of Brasilia and the municipalities.

Water supply and sewerage services in the country are provided through various arrangements. The 26 regional or state water companies provide water supply and sewerage services to about 4000 of the 5564 Brazilian municipalities. There are 1500 municipal water supply and sewerage companies, which operate as public water companies. The 39 remaining municipalities are managed through privately operated concessions.

Coverage data show that access to water supply services increased slowly from 92 percent in 1996 to 96 percent in 2006. Access to urban sewage collection (by networks and septic tanks) has increased from 62 percent in 1996 to 67 percent in 2006, while solid waste collection is almost universal. Yet, the access to water supply and sewerage services shows wide variations within the country. In the north of the country, only 84 percent of the urban population has access to water supply, compared to almost 100 percent in the south and southeast. Yet, the service gap in water supply is closing, as can be seen in Figure 1. For sewerage, the gap is much wider. Access to sewage collection services has not yet reached 13 percent in the north. It is 40 percent in the northeast and center-west regions, 66 percent in the south and over 89 percent in the southeast.

Sewage treatment levels are even lower. According to National Sanitation Information System (SNIS) data, only 32 percent of urban wastewater that is collected is actually treated. Again there are large variations among regions with sewerage treatment coverage much lower in the northern regions compared with the southeast.

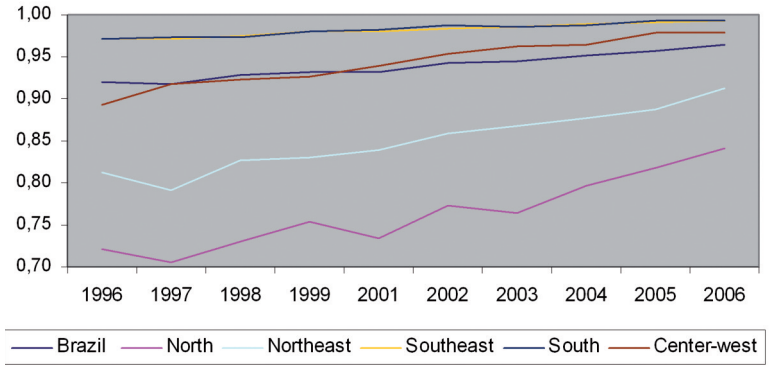


Figure 1: Development of access to urban water supply by region
Source - IBGE-PNAD (1996-2006)

A new era for the water and sanitation sector

Brazil is entering a new era in the water supply and sewerage sector. Firstly, a new water law was approved after a long hiatus of 20 years in which no laws were enacted. The new law lays out the basic objectives of water policies and states that the federal government is responsible for designing a federal plan for the sector. A new element in the law is the inclusion of performance criteria for utility operators in the allocation of federal resources. The law provides for the establishment of a National Information System for the Water Supply, Sewerage, Solid Waste and Drainage Sector. The federal government is responsible for supporting the organization of information systems in the sector. However, the law institutes a decentralized approach with the establishment and implementation of the plan being the responsibility of local service providers. With the creation of the National System of Basic Sanitation Information (SINISA), the law essentially legitimizes the positive experience the country has had with SNIS.

Second, the government has embarked on a Growth Acceleration Program (PAC) that aims to improve growth and reduce poverty and has allocated R$40 billion (US$ 23 billion) for investments in water supply, sewerage and solid waste in the period from 2007 to 2010. This investment programme is results-based as it has set targets to be met.

Because of the results-based character of the PAC, the presence of an information system that can monitor the outcomes and impacts of sector policies and programmes has become essential. Brazil already has such a system in SNIS. The next sections describe the origins and development of SNIS, its current use in monitoring programmes and the challenges ahead for SINISA.

The origins and development of SNIS

In the beginning of the 1990s the country did not have a sector information system that could provide data for sector planning and policy formulation. In 1992, the Water Sector Modernization Program, funded by the World Bank and the federal government, decided to allocate resources to develop such an information system, called SNIS. In 1996, SNIS was established and at first focused exclusively on water supply

and sewerage services. From 2003 onward, it also started to include solid waste data, and a drainage component is currently being developed. The basic responsibility of SNIS was to collect, treat, store and disseminate sector information and indicators. This sector information encompassed all aspects of service delivery: institutional, administrative, financial, operational and quality.

Since that early beginning, SNIS has now built a database with 12 years of historical data on the performance of water and sewerage utilities and four years of data for solid waste. These time series data increasingly offer the possibility to detect trends in the relationships between the different elements of service provision. As such, the data can serve as a tool to monitor the outcomes and impact of sector policies and enable policymakers to design new policies based on actual and historical information. SNIS collects information directly from the utilities irrespective of their management structure through a standardized data tool. The providers send the information to SNIS on a voluntary basis. The annual data collection takes place after the closing of the year, so in 2007 data are collected from the previous year. In 2007, SNIS collected data from 374 utilities that provide water and sewerage services. These 374 utilities represent 3957 municipalities. As the solid waste data collection was initiated much later, it is much smaller in size, reflecting the performance of 230 municipalities. The level of participation in SNIS is shown in Table 1. Table 1 not only shows that the number of utilities participating is increasing, but that participation rates start to accelerate once a certain momentum has been achieved. The more utilities participate in the system, the more valuable it becomes to be part of the system.

In 2007, the SNIS database consisted of four million data observations. As can be seen in Figure 2, the sharp increase in the number of participating municipalities started in 2001.

Information collected by SNIS

SNIS collects, as mentioned before, a wide range of data on operational, financial and management aspects of service provision. It has also over time slowly incorporated a larger set of service quality indicators with regard to water quality and customer quality. On the basis of these data, SNIS calculates a large set of performance indicators that provide information about the technical performance, financial viability and customer satisfaction regarding the services provided. SNIS has data for each utility and for each municipality served by the utility. Thus, there are two levels of data within SNIS: the utility level and the municipality level. This is necessary as the regional utilities in Brazil serve many different municipalities.

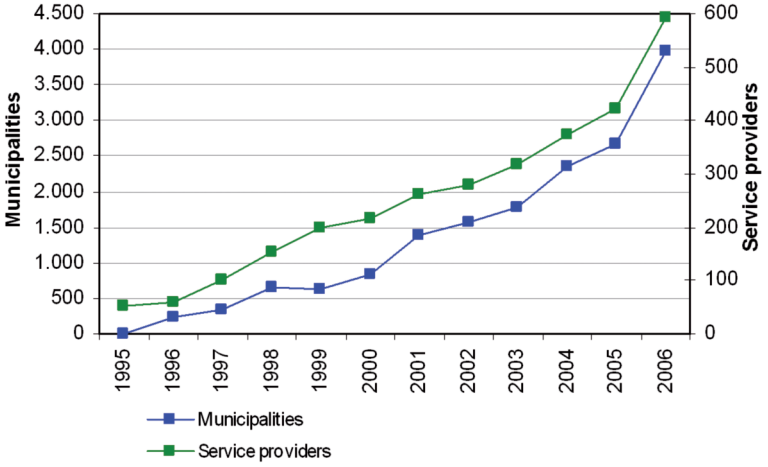


Figure 2: Development of the data availability in the SNIS database

SNIS products

Once the data are collected and analyzed, SNIS disseminates the results of this process. Since SNIS began to collect data, it has produced annual reports on the state of the water and sewerage sector, as well as for the solid waste sector. The 'State of the Sector' annual report includes all the data collected by utility and by utility grouping. The annual reports are produced as hard copies and can also be viewed on the SNIS website at www.snis.gov.br. SNIS also regularly produces a general report on the sector that looks into more general trends and provides a national analysis of the data.

The website includes performance data, supporting documents on the methodology that SNIS uses and a glossary of the definitions used for each type of data and performance indicator included in the database.

The management of SNIS

SNIS develops an action plan in the beginning of each calendar year, in which all stakeholders participate (the utilities, technical specialists, data users and the government). The action plan is developed based on the lessons learned from the data collection process, the expectations of stakeholders with regard to the system's further development and the ability to mobilize the necessary inputs to undertake the next round of data collection. On the basis of this analysis, the goals for the next year are defined, and a time table is established. Special attention is given to ensuring that coordination with the stakeholders takes place.

The annual SNIS cycle consists of six steps: (i) planning; (ii) preparation of the data collection process; (iii) actual data collection; (iv) data quality control and transfer of data into the SNIS database; (v) data analysis and production of data reports; and (iv) dissemination of the reports.

Use of SNIS performance data

The SNIS data and performance indicators can be used by different stakeholders in different ways.

A first possibility is to measure a utility's performance against that of other utilities in the country.

The data also has important uses for the government. State and municipal governments can use the data to gain insight into the performance of their utilities. This data can be taken into account when making investment decisions concerning the utilities. The

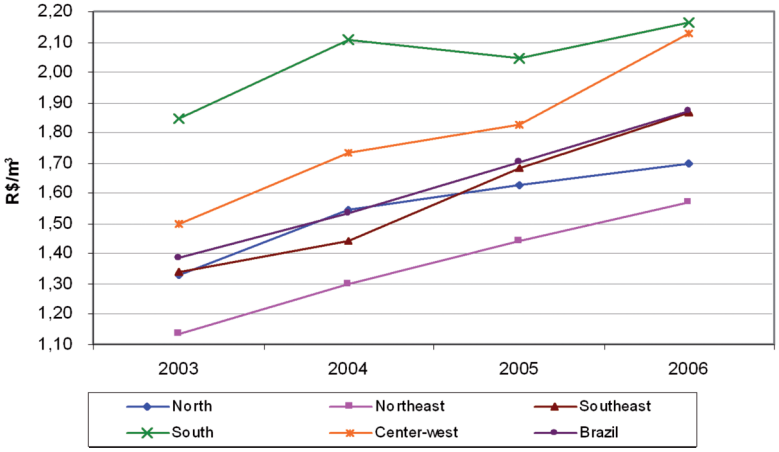


Figure 3: Average water tariffs in Brazil by region between 2003 and 2006

Year	Water supply and sewerage		Solid waste	
	Utilities	Municipalities	Municipalities	Solid waste operators
1996	59	226		
1997	100	337		
1998	155	646		
1999	198	615		
2000	217	838		
2001	260	1379		
2002	279	1573	108	283
2003	319	1781	132	317
2004	374	2351	162	440
2005	422	2667	192	583
2006	592	3957	230	772*

Source: SNIS - *preliminary data

Table 1: Development of participating utilities and municipalities in SNIS

federal government can use the database in the prioritization of its resources allocated to the sector and link resource allocation to sector outcomes. This function has been instituted in the new Water Law and will be an implicit responsibility of the new SINISA. State and municipal regulators can also use the data, especially now that SNIS provides municipal information for utilities that provide water and sewerage services to many different municipalities.

In addition, SNIS data can provide the general public, press, political representatives, non-governmental organizations and other civil society groups with information about how well they are being served, and how the performance of their service providers holds up against others. As such it is a tool that can provide more transparency in the sector.

Innovations in SNIS

Another innovation is outsourcing. While in the beginning all data quality control was undertaken by the SNIS team, SNIS subsequently developed software to undertake data consistency checks and outsourced the process of data quality control to a private firm, which uses the developed software. This adds an additional dimension of objectivity to the data control process. A firm has also been contracted to assist in the data collection process by providing helpdesk services during the data collection process. These services include verifying whether data has been received by the utilities, assisting utilities in case clarification is needed and following-up on the return of the data forms to SNIS.

The improvements and innovations undertaken in SNIS's management have also been implemented in the urban solid waste component.

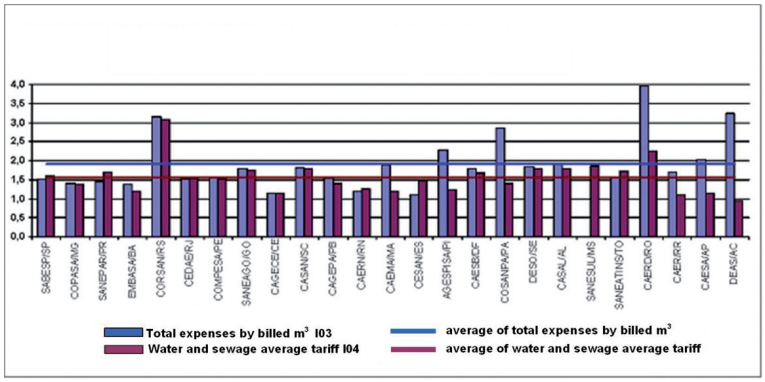


Figure 4: Total average tariff and expenses per m³

Lessons learned

During its 12 year history and continual evolution, SNIS has learned a number of important lessons:

- Strong leadership and efficient coordination are the basic ingredients for the implementation and maintenance of a sector information system.
- Building a national sector information system takes time and effort. Given the large number of utilities involved, the type and scope of data collected and analyzed, and especially the continuous updating of the system, the process requires time, patience and continuity.
- Initial resistance of service providers to publish records of their performance needs to be overcome.
- Even when utilities are willing to provide data, a set of incentives is needed to ensure that the data submitted is of high quality.
- Standardization of data through the use of specific data definitions is critical to ensure the quality and comparability of data, as is the training of service providers in the submission of high quality data.
- The ultimate sustainability of a national sector information system depends on the degree in which the sector stakeholders take ownership in the system, and as such the data should stay in the public domain while being disseminated vigorously.

The challenges of SINISA

SNIS has been used directly in the design and monitoring of public policies in the water, sewerage and solid waste sectors. A major investment programme in Brazil, the 'Sanitation for All' programme has been using SNIS to define the eligibility criteria for gaining access to its investment funds (based on the indicator of water losses), as well as to monitor the investment programmes that are funded. In this programme, the utilities that receive financing must agree on performance improvement programmes with the Ministry of Cities, while the performance indicators are measured and monitored by SNIS.

The new 11,445 Law, which explicitly formalizes the importance of a sector information system and provides it with a central responsibility in the allocation of government investment resources is a testament to the positive experience the country has had with SNIS over the past 12 years.

The new SINISA will have to integrate many different databases in the country, while coordinating with the different regulatory agencies and other stakeholders. The integration of these different local and regional systems with a focus on water resources, health and the environment is important for the new SINISA. However, determining how to bring these databases together, ensure their compatibility and improve their usefulness over time will require a lot of thought. It is clear from experience that it will take time before SNIS is gradually transformed and incorporated into SINISA. ●

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A sharp improvement in the efficiency of Dutch water utilities: benchmarking of water supply in the Netherlands, 1997-2007

The efficiency and quality of The Netherland's water supply sector has improved markedly over the past ten years. **THEO SCHMITZ** and **PETER DANE** look at the success of the voluntary benchmarking programme currently in place and developments for the future.

The Dutch water supply benchmarking programme was established ten years ago to increase the efficiency, quality and transparency of the sector. 'Reflections on Performance 2006' is the fourth published comparative study within the Dutch water supply sector commissioned by its association Vewin. The benchmarking programme compares the performance of water supply companies in each key performance area (water quality, service quality, sustainability, and finance and efficiency) in an impartial manner.

Benchmarking in the Dutch water supply sector is paying off. Since its introduction in 1997, the quality of drinking water has constantly improved and quality services have been provided, while costs and rates have declined in real terms. In addition, the sector has proved to be able to operate in a sustainable manner. A study held at Erasmus University in Rotterdam confirms the positive effects of the benchmarking programme. This study shows that the efficiency of the sector has improved by more than 23 percent in the ten-year period of voluntary benchmarking (Figure 1).

Transparency and learning effects

The benchmarking programme provides a better understanding of the performance of water supply companies for shareholders and board members, the government, users, scientists and, of course, the participating water supply companies themselves. All companies associated with Vewin have taken part in 'Reflections on Performance 2006' (Figure 2), which provides an overview of the performance of the Dutch water supply sector.

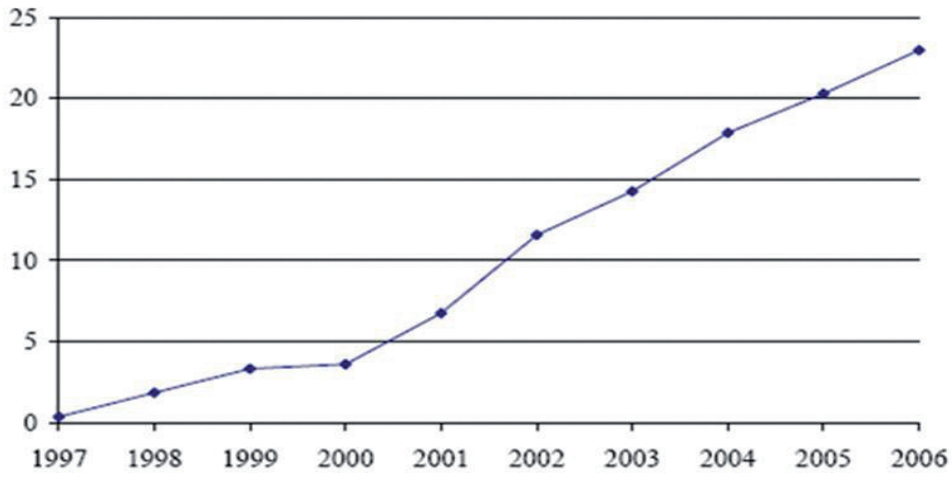
The benchmarking programme plays a central role in the water supply sector. In the new Drinking Water Act the present benchmarking programme will be the basis for future compulsory benchmarking activities. The water supply sector supports the idea of making benchmarking, currently on a voluntary basis, compulsory for the entire sector. In addition to increasing the transparency of company performance, performance benchmarking provides water supply companies with instruments to improve their business processes. In the past ten years, companies have adopted each others' best practices.

Reflections on Performance 2006

The 2006 Benchmark is the most recent business comparison in the water supply sector in the Netherlands. The objective is to further increase the efficiency, quality and transparency of the sector. Benchmarking also took place in 1997, 2000 and 2003. This has allowed for comparison of the performance of drinking water supply companies over a longer period of time. Benchmarking is conducted in four areas: water quality, service quality, sustainability, and finance and efficiency (Figure 3).

The benchmarking programme focuses on activities ranging from identifying and containing sources of untreated water to supplying drinking water to consumers. 'Other water', such as industrial water, and other activities that are not related to drinking water are outside the scope of the study. The benchmarking programme also does not include other links in the overall water chain: sewerage and wastewater treatment. In the Netherlands, these services are provided by local authorities and water boards, rather than by drinking water supply companies. These players, with which the water supply companies closely collaborate, are also becoming increasingly involved in benchmarking. Ten drinking water supply companies took part in Reflections on Performance 2006, together representing 100 percent of the water supply sector with 7.4 million connected properties (households and businesses).

Figure 1: Percentage efficiency improvement 1997-2006



Parameters

The quality of drinking water from all water supply companies was well above the legal requirements. An understanding of the structure of the Water Quality Index helps to point out where improvements can be made. The parameters cover four groups: acute health parameters, non-acute health parameters, technical parameters, and customer-oriented parameters. Additionally, for this benchmark a poll was held asking people about their perception of the quality of drinking water. The quality of drinking water was rated 8 out of 10 on average. This is

an improvement compared with the rating of 7.7 in 2003. Customer satisfaction with respect to the quality of drinking water is also shown in the following statistics: 89 percent of water users are satisfied with the price/quality ratio of drinking water and 94 percent are satisfied with the taste.

Services rating: 7.6 out of 10

Consumers may interact with their water supply company in different ways, e.g. when their meters are read, when changing their addresses or when making complaints. Services from water supply companies were compared using a detailed questionnaire. Topics included were the telephone accessibility of water supply companies and the continuity of water supply. Water supply companies scored an approval rating of 7.6 out of 10 on average for their services.

The figures for services of drinking water supply companies were compared with those of other organizations operating nationwide in providing basic needs. All water supply companies scored higher than the following reference sectors:

- Post office services: 7.2
- Supermarket chain: 7.2
- Power company: 6.9
- City/Regional council: 6.6
- Public transport company: 6.0

Environmental footprint

Water supply companies abstract, treat and distribute water. Some elements of operations have an impact on the environment. Water supply companies aim to keep the impact as low as possible by seeking a sustainable balance between their operations, the resulting environmental impact and conservation of nature. The benchmarking process not only addresses the impact on the environment made by drinking water supply companies, but also the positive contributions to the environment they make.

Energy consumption

The energy consumption that is analyzed relates to the production and distribution process of drinking water. A distinction is made between sustainable and conventional energy. Compared with 2003, energy consumption has dropped. Since 1997 the overall energy consumption for each cubic metre of drinking water produced has risen by four percent. That is a result, among other reasons, of an expanded production process within some drinking water companies incorporating water softening methods and of the application of new treatment technologies, such as Ultraviolet treatment and membrane filtration. The so-called 'centralized softening' reduces the amount of lime deposits in water pipes. In addition, consumers will have to buy fewer water softeners, if any. Therefore, the consumer saves on costs and has a reduced environmental impact at the same time.

Reusing treatment residuals

In 1995, the drinking water supply companies founded the 'Reststoffenunie' (United Residuals Treatment Company) in an effort to find ways to recycle residues from the production of drinking water, thus reducing or removing their impact on the environment in a financially attractive manner. At this point in time approximately 94 percent of all residual substances are being reused. For example, ferriferous sludge released after backwashing rapid sand filters is being used as colouring and filler in the production of red bricks.

Dehydration

Dehydration is a theme for which the water supply sector is proactively seeking solutions. Applied solutions include moving the groundwater boreholes to areas that are not prone to dehydration and using surface water rather than groundwater. In contrast, extra groundwater may be abstracted in excessively wet areas.

If groundwater is abstracted near natural areas that are strongly dependant on the groundwater level compared to the soil, the land may dry out locally. Water supply companies abstract groundwater, as do the industrial and agricultural sectors. According to the Dutch national water regime's Fourth Policy Document, the policy targets for the water supply sector contain the provision that after the year 2000 any growth in the abstraction of groundwater must have been concluded. This objective has now been realized. Abstraction of groundwater for drinking water purposes currently fluctuates around the 1990 level. At the same time, it should also be mentioned that abstraction of groundwater by water supply companies does not always result in the soil drying out. Companies have moved their operations to areas that are less prone to dehydration, and companies also replenish the groundwater supplies. In other words, dehydration in an area that is prone to dehydration may decline, while the overall volume of abstracted groundwater remains the same.

Excessive groundwater

Along with dehydration, the opposite problem of excessive groundwater also occurs. This takes place when the water level is structurally too high and hampers the existing user functions in the affected area. Water supply companies can play a role in resolving the problem of excessive groundwater outside the peat bogs by pumping extra quantities for drinking water supply.

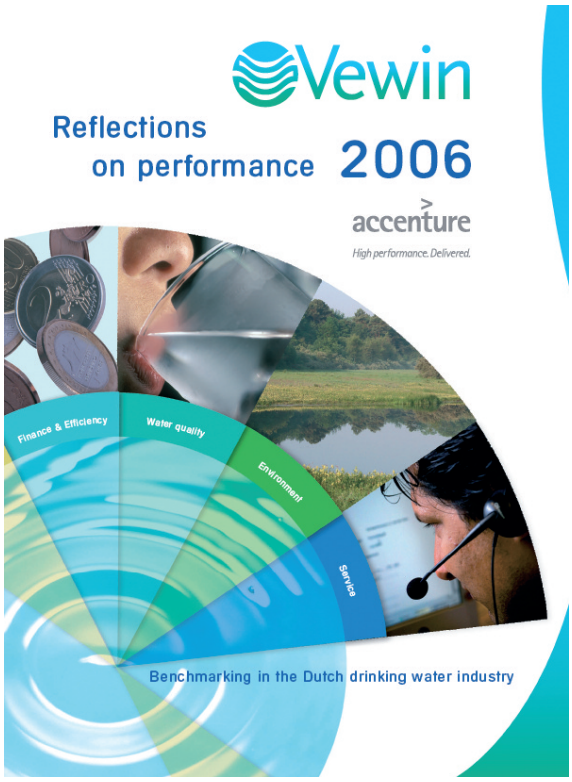


Figure 2: Reflections on performance

Conservation of nature reserves

In addition to their efforts in the recycling of residual substances and the optimal extraction of water volumes, drinking water supply companies make a positive contribution to the environment in the form of conservation of nature reserves. Water supply companies are often responsible for the management of groundwater protection areas and nature reserves. Of a total of 121,400 hectares of

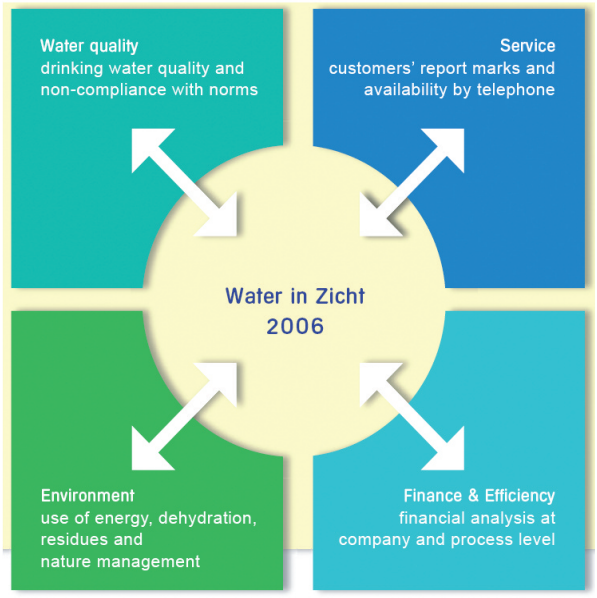


Figure 3: Benchmarking areas

groundwater protection areas, 85 percent are also used for purposes other than water extraction. The remaining 15 percent are exclusively being used as water catchment areas. Three water supply companies were awarded the 'Sustainable Land Management Gold' certificate by the Ecolabel Foundation, while a fourth company has nearly completed the certification procedure. The certificate recognizes success in 'maintaining the activities, both in accordance with policy and in the sense of technical aspects, required for the intended functions of a defined area in a durable manner'. Key issues include the use of pesticides, making roads and parking areas fluid-tight, and the extent of fertilisation.

Finance and efficiency

The price of water (exclusive of taxes) has declined since 1997 in real terms. Although the connection costs and price per cubic metre have increased since 1997 by 2.2 and 16.3 percent respectively, the increase is well below the rate of inflation of 23 percent since 1997. After correction for inflation, prices have decreased by 16.9 percent per connected property and by 5.4 percent per cubic meter in real terms. Some of the factors behind this trend include further automation of processes and fewer staff being employed.

Water rates

Water rates have been compared in five customer situations. The average water rate for a household using 130 cubic metres a year is €1.38. In 1997, 2000 and 2003 the figures were €1.25, €1.34 and €1.38 respectively. After correction for inflation, the water rate in this user situation has decreased by 10.1 percent in the period from 1997 to 2006 (Figure 4).

Capital and operating costs

The average capital cost of €42 per connected property has hardly changed since 1997. The spread among water supply companies with the lowest and the highest capital costs has been sharply reduced since 1997 by 24 percent (€16 per connected property). Operating costs amount to approximately half the overall costs. The average operating costs amount to €96 per connected property. After correction for inflation, these costs have declined by 17 percent since 1997.

Next to VAT, the tax on residential water consumption and groundwater tax are the main contributors to the overall tax bill. Companies also pay provincial groundwater levies and charges on public land. Charges on public land include pipeline and concession fees levied by certain local councils.

Future of the Dutch benchmarking programme

Benchmarking in the Dutch water supply sector is continuing to develop. First the national benchmarking system will change from voluntary to compulsory. In addition, Dutch drinking water companies are involved internationally in the North European Benchmark Co-operation (see page 11). Within this co-operation a growing number of European water utilities are being compared. Finally, the Dutch drinking water companies have started cross-sector benchmarking. Drinking water companies can be compared to companies in other sectors on various levels. Benchmarking will thus continue to create new horizons for a successful drinking water industry in the Netherlands. ●

Vewin: Association of Dutch Water Companies

Vewin is the national association of Dutch water supply companies, founded in 1952. At present ten water supply companies operate in the Netherlands. Vewin focuses primarily on representing the interests of its members in The Hague and Brussels by creating an environment in which members are able to achieve their objectives in an optimal manner.

The representation of members' interests is a crucial task, especially when the preparation of government policy documents on matters such as water management, the environment and urban and rural planning are on the agenda. Vewin naturally takes a leading position, providing expert information and advice in the preparation of new legislation relevant to the sector.

Vewin cooperates with nature and agricultural organizations. It also addresses the challenge of pollution of the sources of drinking water. In cooperation with national ministries of health, housing, and economic affairs, as well as facility suppliers and research institutes, Vewin advocates for the sustainable use of water in the Netherlands. Together with the Association of Water Boards it supervises experiments in the overall water management process, in particular regarding sustainability, the environment and cost efficiency, transparency and customer interests. In its contacts with coordination organizations, such as the Inter Provincial Platform and the United Dutch Local Authorities, Vewin seeks to initiate, develop and support the interests of the water supply sector and of individual water supply companies.

International benchmarking

Vewin is a member of the North European Benchmarking Co-operation (see separate article), an initiative of the national water associations and several water utilities of North European countries, supported by the International Water Association (IWA). The objective of the co-operation is to facilitate water utilities in their continuous efforts to improve efficiency and transparency. For more information, see www.waterbenchmark.org

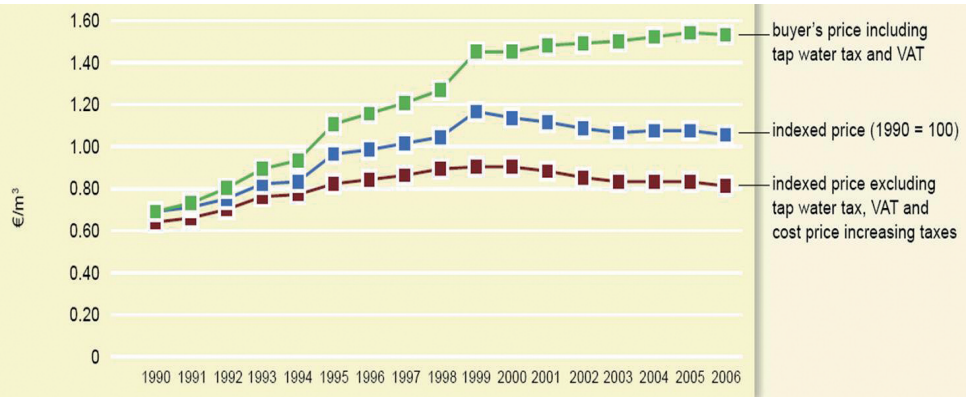


Figure 4: Development of water rates exclusive of taxes and corrected for inflation

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The authors wish to acknowledge Peter Geudens (Vewin) for his contributions to this article and the development of the national benchmarking programme.

Performance monitoring and benchmarking for urban water supply and sanitation in Tanzania

Monitoring and benchmarking in the urban sub-sector has been used in Tanzania for over a decade. **ELIZABETH KINGU** and **DIRK SCHAEFER** discuss the development of Urban Water Supply and Sewerage Authorities (UWSAs) and their use of the MajIs database system to improve infrastructure and service provisions during this time.

As in many countries, water supply and sanitation in Tanzania has different institutional set-ups, responsibilities, and financing and implementation arrangements for urban and rural sub-sectors. This is also reflected in the way monitoring in both sub-sectors is carried out. While monitoring and benchmarking in the urban sub-sector was introduced several years ago and has, in the meantime, experienced significant improvements, monitoring in the rural sub-sector is still underdeveloped. This article therefore focuses on the experience gained in performance monitoring and benchmarking in the urban or commercialized water supply and sanitation sub-sector in Tanzania.

In the 1990s it was seen that water infrastructure in many parts of urban Tanzania was old and dilapidated. Operation and maintenance were insufficient, service delivery and customer orientation poor and tariffs too low to ensure sustainability.

In 1992 the concept of establishing autonomous urban water service providers, operating on the basis of commercial principles, was introduced. Consequently, the waterworks ordinance was amended in 1997 to affect the establishment of Urban Water Supply and Sewerage Authorities (UWSAs), governed by boards of directors. Today, 19 UWSAs are operating in the regional urban centers of the country, while in the commercial capital Dar es Salaam, a separate institutional set-up separating asset holding and operation is currently in place.

Depending on their financial performance, UWSAs are assigned to one of three different categories:

Category A UWSAs meet all of their costs of operation and maintenance, depreciation and part of their investment needs and are eligible to set their own salary scheme;

Category B UWSAs receive subsidies to cover part of their electricity bills;

Category C UWSAs receive subsidies for personnel emoluments for government employed staff and for part of their electricity bills.

The history of monitoring urban water supply and sanitation

Information about the status of existing infrastructure, the commercial and financial situation of service providers and about performance of service provision is crucial for the success of sector reforms. It allows key stakeholders like ministries and regulators to allocate resources according to actual needs, to set priorities and to provide the right incentives for utilities to improve performance.

The availability of relevant and accurate information was already insufficient even before the restructuring of the Tanzanian water sector. Decentralization of water supply and sanitation, however, created a particular challenge with regard to collecting information on the status and developments in the sector.

After their establishment each UWSA entered into a Memorandum of Understanding with the Ministry of Water and Irrigation (MoWI). The Memorandum of Understanding specifies the roles and responsibilities of both the service provider and the MoWI. It includes formats for monthly and annual reports (including audited accounts) comprising technical, human resources, commercial and financial aspects of service provision. It

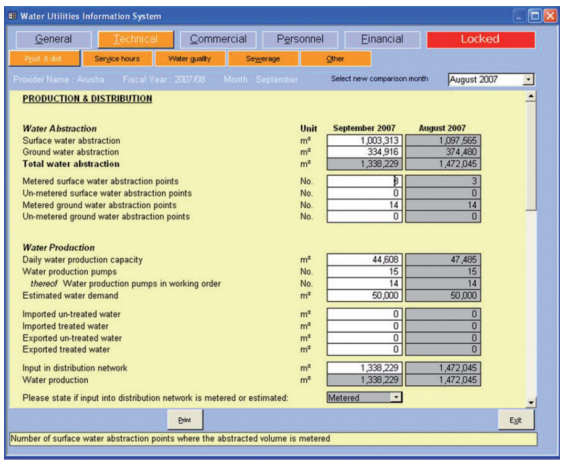


Figure 1: MajIs data entry sheet

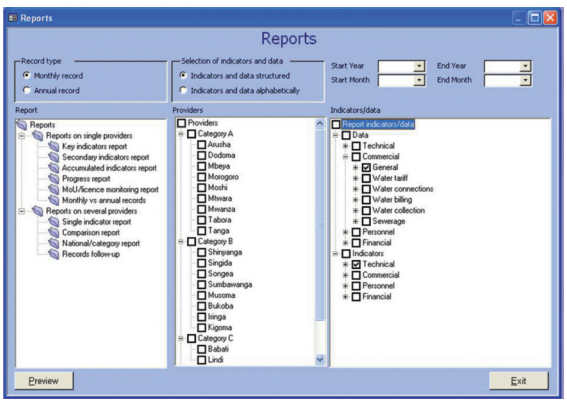


Figure 2: MajIs report selection

also includes a very comprehensive list of performance targets set for each UWSA individually. Memoranda of Understanding are renewed every three years and performance targets are refined accordingly. The current Memoranda of Understanding expire in June 2008.

With the Memorandum of Understanding as the basis for monitoring and benchmarking in the urban water sector in recent years, performance monitoring for urban water supply in Tanzania has experienced a gradual development and improvement. However, the follow-up on achievement of performance targets as well as on the accuracy of the data provided has always been weak for several reasons. The manual, paper-based reporting for which providers often produced 50 and more pages per month made analysis of data and accuracy checks very cumbersome. The fact that providers could report results of key performance indicators without providing the basis for their calculation limited the comparability and thereby the relevance of data.

Nevertheless, the fact that UWSAs were used to reporting detailed information on a regular basis to MoWI was an essential asset during the development and implementation of a computerized information system in 2006.

Table 1: New functional responsibilities for water supply and sanitation

Ministry of Water and Irrigation (MoWI)	*Energy and Water Utilities Regulatory Authority (EWURA)*
• Policy and strategy development	• Approves business plans of UWSAs
• Advises EWURA in formulation of technical guidelines and standards	• Issues operating licenses to UWSAs
• Co-ordinates planning for projects of national importance	• Approves service tariffs
• Secures finance for projects of national importance	•Publishes technical guidelines and standards
• Monitors performance and regulates community owned water supply	• Monitors water quality and performance of UWSAs
• Provides technical guidance to councils	• Collects and publishes comparative data

Source: National Water Sector Development Strategy, 2008

Monitoring urban water supply and sanitation today

The water utilities information system (MajIs)

With assistance from the German Government through the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), the paper-based monthly and annual reports were replaced in 2006 by the computerized Water Utilities Information System (MajIs), which allows for efficient data entry, storage and analysis.

MajIs is a database with comprehensive analysis tools tailor-made for the Tanzanian urban water sector. The database content is based on the reporting formats provided in the Memorandum of Understanding whilst being slightly more comprehensive. It comprises a set of data sheets including technical, commercial, human resources and financial information – including a detailed chart of accounts for operation and maintenance expenses. The data sheets are filled in by the UWSAs on a monthly basis as well as at the end of each fiscal year. MajIs was developed over a period of about 12 months, which included six months to define the content and general structure and six months for programming. The software was developed locally to ensure that future support and maintenance could be provided at affordable costs.

MajIs was introduced to the 19 UWSAs and Dar es Salaam in July 2006. At about the same time the autonomous Energy and Water Utilities Regulatory Authority (EWURA) became operational. According to the recently endorsed National Water Sector Development Strategy, EWURA is responsible for performance monitoring of UWSAs and all other commercially run water utilities in Tanzania (currently about 85). This is why MajIs is today administered by EWURA with a copy of all reports being submitted to a server at MoWI where the Department of Commercial Water Supply and Sewerage uses the information for its specific tasks. Today the 19 UWSAs and the Dar es Salaam utility are using MajIs as their reporting tool to both EWURA and MoWI. The software is installed at all utilities, and information is submitted electronically, primarily by email.

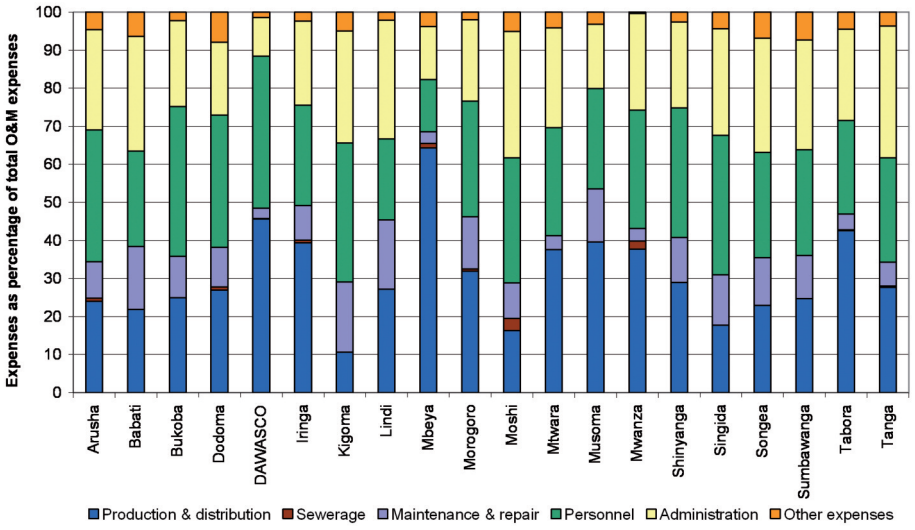
MajIs not only helps MoWI and EWURA to monitor performance efficiently and compare utilities, it also significantly reduces the reporting work load at the utility level. In the past the person in charge of reporting spent about two weeks per month writing the requested report to MoWI. With MajIs it now takes only two to four hours to finish a report, assuming that the related departments provide the required information on time and in an appropriate format.

The paper-based reports in the past left a lot of room for interpretation by the UWSAs and often contained calculation errors that could only be found through laborious analysis including re-entry of data in MS Excel sheets or the like. MajIs comprises a number of data accuracy checks from validation during data entry up to automatic comparison of annual reports with the 12 related monthly reports.

Analysis of data

Computerising performance monitoring has a number of advantages. It not only allows for storing data safely, but if developed according to the needs of the institutions in charge, a water sector information system can support all

Figure 3: Operation & Maintenance costs breakdown



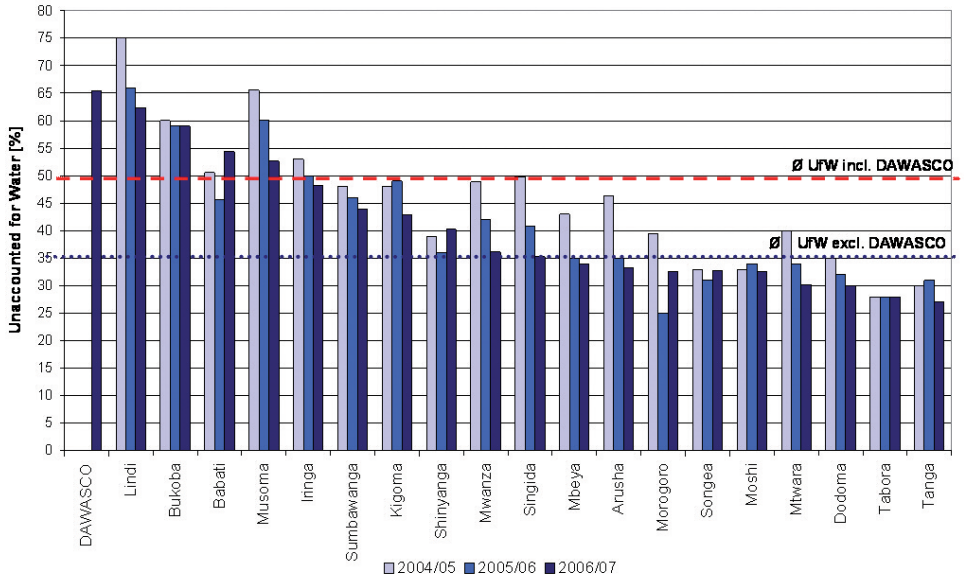


Figure 4: Unaccounted for water

relevant stakeholders in fulfilling their tasks more efficiently. It ensures that the data collected is actually comparable and can be analysed more efficiently.

Data collected through information systems should be raw data that is as minimally processed internally as possible to avoid interpretation on the side of the utility and also to minimize calculation errors. Calculation of indicators should be done by the software to ensure that the results can actually be compared.

To support data analysis, MajIs offers a variety of user friendly reports that can be generated from the database. Depending on whether the user is located at a provider, EWURA or the MoWI, the user can create reports showing the progress of an individual provider on data entered in the data sheets or on a wide range of indicators defined and calculated in the system. MoWI and EWURA have the ability to produce reports comparing the performance of several providers. All reports can be produced in different formats (MS Word, pdf) or exported to MS Excel for further processing.

UWSAs' obligation to provide information to MoWI and EWURA is stipulated in the Memorandum of Understanding and in the licenses issued by the regulator. Nevertheless, when developing MajIs it was kept in mind that some incentive to the providers would help to increase their willingness to apply the software. The software and in particular the report creation facility were designed in a user friendly way that also allows the utilities to analyse their own data, to monitor trends and to follow up on performance targets. i.e. MajIs can and should be used as an internal management information system.

Data accuracy

Introducing an information system does not, however, automatically or immediately lead to reporting of accurate data. Improving data accuracy is a process that requires the commitment of all parties involved. Utilities must see the benefit of collecting and processing information on their performance. Without it, a company cannot be run professionally.

The institution responsible for performance monitoring has to ensure that the data received is actually analysed on a regular basis. Within the framework of effective performance monitoring, it is essential to provide regular feedback to those who provide the data. In the past UWSAs would only receive feedback once a year through the Annual Report on UWSAs' performance produced by MoWI and during the Annual General Meeting attended by all UWSAs during which this report is launched.

Since the establishment of EWURA, UWSAs get more detailed feedback, e.g. during tariff reviews. EWURA is currently developing routine data checks to ensure that every incoming report is checked within a given timeframe. Routine data analysis will not take more than 30 minutes per monthly report and will trigger more in-depth analysis only when required, e.g. in case of negative trends for key performance indicators or apparent data inaccuracies. Brief feedback on receipt and evaluation of data will be provided to the utilities on every report submitted.

All in all one should expect that data accuracy can be achieved stepwise and that it will take approximately two years after implementation of an Information System to create confidence from both sides in the data's accuracy.

Information systems alone will not guarantee data accuracy though. Inspections carried out by EWURA are used to validate information, to look into processes of data collection and reporting and to get a sense for the source of potential inaccuracies (e.g. production volume will always be based on estimates if no bulk meter is installed).

Table 2: Performance of Category A UWSAs in selected indicators in 2006/07

	UWSAs	UFW* [%]	Collection efficiency [%]	Staff per 1000 connections [No.]	Metering ratio [%]
Category A	ARUSHA	33.3	93.6	7.3	100
	DODOMA	30.0	93.0	8.7	100
	IRINGA	48.0	96.6	10.2	72.2
	MBEYA	34.0	77.5	7.3	64.2
	MOROGORO	32.9	92.1	8.3	80.2
	MOSHI	31.0	98.7	8.5	100
	MTWARA	34.0	78.0	9.9	85.2
	MWANZA	36.0	98.9	5.9	94.0
	SHINYANGA	42.6	89.5	13.2	71.8
	TABORA	28.0	74.6	8.9	79.0
	TANGA	27.0	96.0	5.9	100

* Unaccounted for Water - Source: MoWI Annual Report Financial Year 2006/2007

Why performance monitoring?

The roles of MoWI and EWURA

Performance monitoring plays an essential role in the various tasks, particularly of MoWI and EWURA. For MoWI under the new institutional set-up, it will mainly help in assessing overall sector performance and in obtaining a sound information basis for the distribution of resources. For the regulator, EWURA, performance monitoring serves to assess the performance of individual licensed utilities against performance targets set in the licence or during tariff reviews. EWURA uses the available information from MajIs and other sources to compare utilities against each other, to identify bottlenecks and best practices and to assist UWSAs in finding the right way to extend and improve services while increasingly covering the costs of operation, maintenance and capital.

EWURA also uses the data provided in MajIs in the tariff review process. While this process has a strong emphasis on trends in operating costs and on cost projections, the data in MajIs is used to analyse technical and commercial performance and to validate the projections and key assumptions made in the tariff applications.

Increased transparency and accountability

Monitoring water utilities helps to increase transparency in the sector. It brings water utilities, which otherwise would operate in isolation, into the light helping them to understand their strengths and weaknesses compared to other utilities and encourages information sharing and exchange on best practices. Importantly it also helps the public to assess the performance of their utilities both in isolation and in comparison to other utilities and to hold them accountable and responsible.

It thereby helps to create comparative competition in a sector that is known for its inefficiencies caused by its natural monopoly situation. This benefit of creating transparency and comparability of UWSAs can already be seen during the regular Annual General Meetings hosted by MoWI. During the meeting the Annual Report showing in detail the performance of all monitored water utilities is launched, and UWSA managements and boards are required to present their utilities' performance during the previous fiscal year. Best performers in certain areas are awarded and possibly promoted to a higher category. Poor performers have to provide explanations for not having achieved their Memorandum of Understanding targets. This naming and shaming creates considerable pressure and provides an incentive to UWSAs to strive for improved performance.

Monitoring access to water

On the national level, MajIs supports the monitoring of progress on a larger scale, providing information on, for example, the number of new connections or kiosks installed during a certain period and thereby about water service coverage. It also plays a vital role in monitoring targets set in the Poverty Reduction Strategy as well as the Millennium Development Goals.

Benchmarking

So far benchmarking in the Tanzanian urban water sector is limited to the definition of what are regarded as international best practice values for a small number of performance indicators. The most common benchmarks applied are:

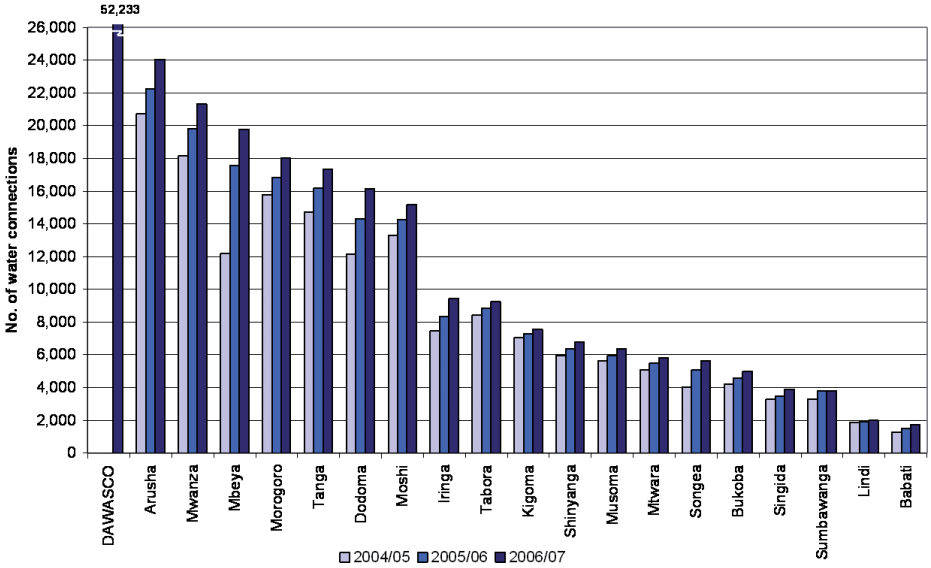


Figure 5: No. of connections

- Staff per 1000 connections (should not exceed 10)
- Unaccounted for water (should not exceed 20%, although none of the UWSAs is anywhere near this target)
- Personnel expenses (should not exceed 30% of revenue collection)

These benchmarks do not sufficiently reflect the differences between the UWSAs, e.g. regarding size or availability of external funding. Therefore, defining these benchmarks has so far helped to provide some guidance on what the MoWI perceives as key performance indicators, but the definition of these benchmarks was not directly linked to incentives for the UWSAs to achieve these targets. Especially for the smaller UWSAs, the set benchmarks are so far from current performance that utilities may find it impossible to achieve them without twisting figures.

Using the data from MajIs, EWURA is currently developing a more appropriate benchmarking for the regulation of UWSAs. It will be based on current best practices in technical, commercial and financial performance and assist not only EWURA in the tariff review process but also the UWSAs in identifying their strengths and weaknesses and in their exchange with other utilities.

Outlook

In looking back over the experience of the last several years, it is clear performance monitoring in the urban water supply and sanitation sector in Tanzania has shown significant improvements. The level and accuracy of information available on the performance of urban water utilities is already ahead of most countries in the region and is still improving fast. The MoWI, EWURA and the UWSAs are playing a crucial role in this process, which improves transparency and accountability and will ultimately help all stakeholders to improve their performance.

One of the most important steps will now be to link performance monitoring better to the allocation of resources. In 2007 the Water Sector Development Programme was launched. This is a sector-wide approach to planning with a budget of $951 M over five years. Although procedures and priorities for resource allocation are not yet sufficiently defined, results of the performance monitoring will play a pivotal role in ensuring that resources are allocated in the most effective and transparent manner.

So far, the monitoring of urban UWSAs only includes the 19 regional centres and Dar es Salaam. The next challenge will be to extend the monitoring to utilities in 107 small and medium towns. The little information available on these utilities indicates that management capacities are weak and availability of data very limited. A rapid assessment will therefore be conducted in 2008 to establish baseline information and to develop a suitable monitoring framework. ●

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The Benchmarking Club of the Hungarian Waterworks Association

The International Benchmarking Network for Water and Sanitation Utilities (IBNET) collects performance data within a sector, allowing comparisons between peers as well as analysis of each company's performance. **ANDRAS KIS** looks at the use of IBNET in Hungary and how this survey technique has been used to improve its water and wastewater sectors.

The Benchmarking Club of the Hungarian Waterworks Association was founded in 2007. While water and wastewater service providers had been planning for some time to start the process of benchmarking in Hungary, the impetus came after the first IBNET (International Benchmarking Network for the Water and Wastewater Utilities) benchmarking survey, funded by the Department for International Development (DfID), was successfully completed in 2005, and participating companies could start to compare their performance to that of their peers **(see page 8).**

The IBNET survey in Hungary was carried out by the Hungarian Environmental Economics Center (MAKK). MAKK collaborated with the Hungarian Waterworks Association in order to identify water and wastewater utilities that would properly represent the diversity of the water and wastewater utility sector in Hungary. The sample included mid-sized and large utilities from all seven regions of Hungary, with a mix of government owned regional and local utilities and privately operated companies.

Water utilities in Hungary have long been contributing data to a wide range of surveys, including mandatory data provision to government agencies, and voluntary participation in industry surveys and Chamber of Commerce data collections. The companies, however, have rarely received structured feedback with analysis of the collected data. The IBNET exercise promised to deliver a report describing the results of the survey, as well as a set of tables and charts for each participating company showing the performance of the utilities in comparison to the full sample.

Twenty-two companies decided to take part in the survey, while data on two privately operated companies, which refused to participate, were collected from public sources, including their websites and annual reports. MAKK prepared an English language report to accompany the data sent to the World Bank, and produced, in Hungarian, a report and utility-specific tables and charts. The results of the IBNET survey were also presented at the Annual Meeting of Chief Financial Officers of the main water utilities of Hungary.

The feedback from the IBNET survey was appreciated by the participating companies and the Hungarian Waterworks Association. Besides providing useful results, the IBNET benchmarking exercise also serves as an example of how a benchmarking process can be implemented.

Seeing the IBNET survey as a good start, some of the companies wanted to move ahead to gather additional data, some of it rather country-specific, compute additional indicators, and start an actual exchange of best practices. Thus, in early 2007, the Benchmarking Club was founded.

Participating companies

While the Benchmarking Club operates under the aegis of the Hungarian Waterworks Association, membership of the Club is optional to the Association's members. In 2007, 18 companies chose to participate, while additional utilities indicated that they would consider membership after the first year of operation. In early 2008 another two utilities became members.

The Benchmarking Club member utilities provide about 60 percent of all drinking water supplied and collect a little over 25 percent of all wastewater generated in Hungary. There is substantial diversity among members. The smallest utility sells a little more than one million m^3 of water annually, while sales at the largest utility exceed 150 million m^3 per year. Some of the companies operate in large towns – with or without serving smaller neighboring communities. Others serve smaller settlements, some of them serving settlements with less than 2000 inhabitants per settlement. There is also substantial geographical variation among Club members. Some members serve just one or two larger towns in flat terrain, while others serve dozens or even hundreds of small villages in hilly and mountainous areas. The source of water also varies between companies; some get their water primarily from bank filtered wells, while other use deep strata water or carstic supplies.

The large diversity of conditions under which the companies operate is appealing for understanding the operation of the water and wastewater utility sector of Hungary. Nevertheless, this variety also poses challenges; comparison of performance indicators between companies needs to be done with caution – carefully considering differences in operating conditions.

Rules of operation

The Benchmarking Club has a management board with five members, who are elected for a period of three years and represent member companies. A mixed board of financial experts as well as engineers is preferred. The management board

meets about six times a year, and its main responsibility is to make sure that the Club is operated smoothly and in a professional manner.

The following eight thematic working groups have been set up to define the data to be collected and the performance indicators to be computed: (i) operating conditions; (ii) water service; (iii) wastewater service; (iv) customer relations; (v) human resources; (vi) investments; (vii) corporate management / strategy; and (viii) finance and accounting.

Each working group has four or five members, who are experts of the member companies in the field of interest of the group. The groups also provide whatever theme specific assistance is needed within the Benchmarking Club.

The actual benchmarking process is carried out by independent experts. The Hungarian Waterworks Association decided to contract the same experts who carried out the IBNET survey and who are currently associated with the Regional Centre for Energy Policy Research (REKK) at the Corvinus University of Budapest.

REKK, in cooperation with the thematic working groups, develops the data collection methodology, including an MS Excel-based questionnaire. Each year, the questionnaire is to be reviewed and updated in the Spring, based on experience gained during the previous year. The questionnaires are completed by the utilities during May and June and they are then returned to REKK, where the data received is screened for errors, and inserted into the database. REKK then computes indicators and compiles summary tables of those data for which indicators are not computed, e.g. information on the strategic planning processes applied by the companies. The companies receive the first results of the benchmarking exercise in early Autumn, just in time to use them for their annual planning.

An important rule within the Benchmarking Club is that of the confidentiality of individual utility data. Within the Club only average figures are shared, and the utilities receive only their own individual indicator values, but not those of others.

The main cost for the operation of the Benchmarking Club is the consultant fee paid to REKK. Member utilities pay a Benchmarking Club membership fee to the Hungarian Waterworks Association, which the Association uses to contract the services of REKK. The Association also provides in-kind support by providing the infrastructure needed for Club meetings, and administrative assistance.

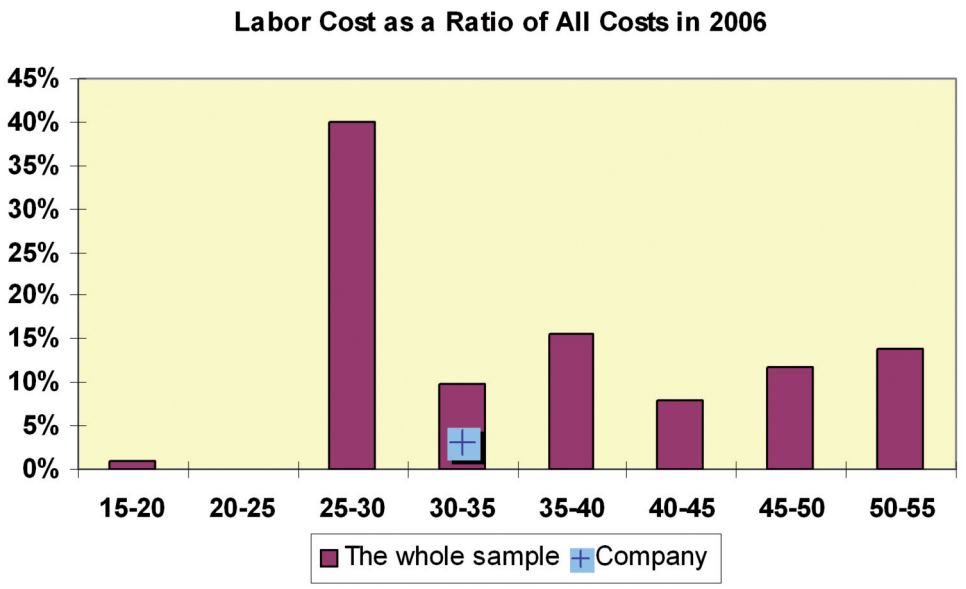

Figure 1: The position of the company compared to the distribution of the indicator values of the whole sample

Annual results

At the end of the annual benchmarking survey, Club members receive a utility-specific document with over two hundred charts and tables, illustrating the relative position of the company in comparison with the other utilities.

During the first year of the Benchmarking Club 150 indicators were computed for two years of data. These indicators were designed by the working groups and the experts of REKK together, partly based on international experience (e.g. IBNET website, International Water Association publications). For financial indicators as of now only nominal values have been computed, but in the future inflation adjusted real values will also be calculated. Indicators on the operation of wastewater treatment plants were computed separately for small, medium and large plants, because of the differences in technologies and economies of scale. While the surveyed data was thoroughly defined in order to ensure consistency across the sample, the results showed that some of the data need to be further defined, for instance costs relating to maintenance vs. repairs, outstanding revenues, and the number of drinking water samples satisfying specific standards.

For each of the indicators a chart depicts the distribution of the values of the full sample and the company's own value, as illustrated in Figure 1. The document also includes a table with the average and standard deviation figures for all indicators, as well as the company's own indicator values. This feedback enables utility managers to observe the performance of their company in comparison with others, without showing the individual indicators values of the other companies, in line with the data confidentiality rules of the Club.

Companies often prefer to compare themselves to a sub-set of the full sample, namely those utilities that are operating under similar conditions. Therefore utilities are assigned to groups based upon specific criteria, and the indicator values for each of these

Table 1: Unit Operating Cost of Water Service in Selected Groups

Group	Indicator value (HUF/m³)
Average number of inhabitants per town - below 3000 (small towns)	224
Average number of inhabitants per town - above 3000 (larger towns)	170
Standard deviation of the altitude above sea level of the service area – above 30 metres (relatively hilly area)	237
Standard deviation of the altitude above sea level of the service area – below 30 metres (relatively flat area)	162
Volume of water sold per km of water network (m³/km/year) – below 6500 (sparsely populated area)	220
Volume of water sold per km of water network (m³/km/year) – above 6500 (densely populated area)	167
Population served with drinking water – less than 85,000 (smaller company)	207
Population served with drinking water – more than 85,000 (larger company)	179
Volume of delivered water – less than 10 million m³/year (smaller company)	203
Volume of delivered water – more than 10 million m³/year (large company)	180

Note: In March 2008 the US Dollar to Hungarian Forint exchange rate was about 167.

Age Distribution of the Wastewater Network as of 31 December 2006	Average of the Sample	Company
0-10 years	46.6%	22.2%
11-20 years	26.7%	31.0%
21-30 years	10.8%	2.8%
31-40 years	8.6%	7.1%
41-50 years	5.0%	33.5%
51-100 years	2.2%	3.4%
>100 years	0.1%	0.0%
Total	100.0%	100.0%

Table 2: Example for a Distribution Table

groups are computed. The table below includes the average values of selected groups for one of the indicators, the unit operating cost of water service.

Lastly, information was collected about the practice of corporate management and the processes and tools used for strategic planning. This information, by its nature, is not numerical. Thus instead of computing indicators, summary tables were prepared showing, for instance, the number of companies using certain standards, or a list of the strategic objectives set forth by the management.

Another type of output that member companies receive is the distribution of the values of a given type of data. For instance, a company may compare the age composition of its wastewater network to the average age composition of the sample companies, as illustrated in Table 2.

In addition to the company specific documents, an annual report is also compiled and shared among the members of the Club. While this report does not include individual utility data, it contains all the average and standard deviation values, summary tables compiled from the responses of the companies, the methodology used during the benchmarking exercise, and a set of conclusions based on a thorough analysis of the data. This document is available to all the members of the Club, but not to external utilities and organizations.

Companies use the results of the benchmarking exercise in different ways. The most typical way in which companies use the results is to identify areas where performance can be improved, i.e. where other companies with similar operating conditions operate more efficiently or at a lower cost. Benchmarking also provides feedback on the success of strategic initiatives, showing whether these initiatives ensured top performance among companies. One of the utilities mentioned that it used the results from the first year of the Benchmarking Club to justify proposed tariffs when seeking approval from the municipal owners of the utility. Another utility used the results to discuss the potential for cost reductions with municipal decision makers.

Sharing of best practices

Obtaining information on the relative performance of a company is useful in itself, but knowing which companies are performing better than the rest, and the reasons for their good or superior performance is even more useful. Since company specific data is handled confidentially, a mechanism was devised to identify companies with good or superior performance. For each indicator the three utilities with the best indicator values were identified and were asked if they were willing to disclose their identities. Having no reason to keep good performance confidential, companies will usually agree in this case to reveal their names and indicator values.

After the list of top performers is compiled, it is shared with all member companies so that they can select those companies, the experience of which they would like to learn about, with regard to specific fields of operation. After the feedback from all companies has been compiled, it is the task of the management board of the Benchmarking Club to organize meetings where best practices are shared via presentations and discussions. The first such meeting took place in March 2008. Three topics were presented and discussed: (i) the ratio of electricity costs to the total operating costs of water production; (ii) pipe breaks and other technical problems in the water network; and (iii) cost savings and enhanced biological pollution reduction through improved wastewater treatment techniques.

Sharing of best practices may also take place at the utility itself, especially when newly introduced technologies are presented to the members of the Benchmarking Club.

Future plans

The Benchmarking Club of the Hungarian Waterworks Association had a promising start in 2007. By the end of its first year the Club had a thoroughly designed set of operating rules, a dedicated management board and thematic working groups, which created and refined the benchmarking survey and indicators to be computed. The participating companies received a large set of data and charts illustrating their positions compared to all other water and wastewater utilities within the Club.

In February 2008 member companies adopted the 2008 work plan, which calls for revision and more precise definition of some of the data to be collected, international cooperation, more active exchange of good practices, and initiatives to recruit additional member companies. Some of these items are detailed below.

In many ways 2007 can be viewed as an experimental or pilot year of the Benchmarking Club. The data survey was ambitious, and in the beginning it was unclear whether certain pieces of data could be collected with ease. Now there is a good understanding of the data generating capabilities of the member companies, and the survey can be adjusted and specific data redefined if necessary.

Some of the companies expressed their desire to gain an international perspective regarding their performance. Therefore, in 2008 the indicator values of foreign, especially other Central European utilities will also be computed and used as part of the benchmarking exercise. The necessary data will be gathered from international benchmarking surveys, such as IBNET. There have also been discussions regarding cooperation with other water utility associations in the region, with the aim of establishing a regional benchmarking programme.

One of the strategic goals of the Club, for 2008 and beyond, is to recruit additional members. This goal is partly driven by the desire to improve the statistical significance of results, and to allow for advanced statistical analysis of the dataset, which requires a larger sample size. In addition, once time series of indicators are available, management can gauge the impact of changes in the company's operations, such as organizational or process reforms, new technologies, or acquisitions. A larger membership will also contribute to wider application of prevailing good practices among Hungarian water and wastewater utilities. ●

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Benchmarking in China's Shandong Province

Rapid urbanization in China's Shadong Province has led to an increasing demand on water supplies and wastewater services. The use of the International Benchmarking Network for Water and Sanitation Utilities in this area is discussed by **GUAN WANG.**

The province of Shandong is situated on the east coast of China (see Figure 1) with a total area of 156,700 square kilometres. There are 17 prefecture-level cities, 31 county-level cities and 60 counties. By the end of 2007, the total population was estimated at 95 million. Water resources in Shandong are scarce: annual per capita available water resources are only 344 cubic metres, which is one sixth of the average level in China. The Yellow River is the main water resource.

In recent years, urbanization has accelerated, fuelled by rapid economic growth in the province. Living standards have gradually improved, and Shandong now has one of the highest per capita incomes in China. By the end of 2007, average Gross Domestic Product (GDP) per capita was RMB28,000 (US$4000).

Urbanization and rapid economic growth have resulted in demand for better water supply services in the province. In order to improve business efficiency and facilitate economic development, the Chinese government has introduced market mechanisms in the urban water supply industry in recent years. These general measures have been complemented by specific goals for the province's urban water supply industry, set by the Shandong Construction Commission and the Shandong Urban Water Supply Association (SUWSA) in 2005. These province-specific measures aim to improve the quality and quantity of water supplied in order to satisfy an increasing demand for these services.

Water is provided by municipal water companies, while wastewater services are usually the direct responsibility of municipalities. There are 109 water utilities of which 30, serving more than 60 percent of the province's urban population, participated in a first benchmarking study.

The launch of benchmarking in Shandong

With the support of the World Bank, SUWSA and PADECO International Consulting Co. Ltd cooperated in the benchmarking exercise. The partners used the International Benchmarking Network for Water and Sanitation Utilities (IBNET) methodology, and selected 30 water-only utilities in the province to participate in the survey.

The sample consisted of two large utilities, Jinan and Qingdao, three county water companies, the Shengliyoutian Water Company of 'Victory' Oil LLC and 14 municipal water companies. The water companies submitted electronic and hard copies of the questionnaire. The hard copies of the questionnaire were officially issued by each company and submitted with official water company records. It took eight months to complete the first study in 2006. The study aimed to set up a system of performance benchmarking.

The benchmarking process encountered a series of challenges related to the local context that needed to be overcome before the survey could be implemented. First, although IBNET is an international benchmarking tool, some of its indicators proved difficult to collect in the Chinese context. In China, water companies do not have statistical data on population per connection or household size. Consequently, the performance indicators calculated using population data needed to be adjusted. It was also difficult to determine the size of the urban population served by the public water supply.

Because of rapid urbanization in the province, as in most developed regions in China, historical data is unreliable as an indicator, especially if census data are already several years old. Second, water supply companies have no incentive to disclose performance data due to weak regulatory enforcement and inadequate water monitoring facilities. Hence, the water association had to put a lot of effort into persuading its members to make the operational and financial information available. Training workshops were organized to help the participants master the use of tools and indicators quickly and to understand the actual benefits of having that information available in managing a utility's operation.

A particular feature of the data collection process that helped to ensure a reasonable quality of data was the participation of three industry experts, who were invited to analyze the business survey data. They repeatedly communicated with the water supply enterprises regarding data that had problems and verified and corrected the data.

After the first evaluation report was prepared and discussed in 2006, SUWSA decided to launch a second round of benchmarking and expanded the number of participating utilities from 30 to 37. SUWSA planned the benchmarking work and sent a notification (No. 12 SUWSA magazine in 2007) to water supply companies in Shandong, followed by a meeting in Qingdao in November 2007. The benchmarking process is to be replicated in the province of Liaoning.

Results

As a result of the rapid population growth, most companies are facing a substantial population increase in their areas of responsibility. The survey reported a much higher total population than was reported in the 2000 census data. Over 2003-2005, the population of the surveyed water companies increased from 11.3 million to around 13 million – an increase of no less than 15 percent in a two-year timeframe. Urban growth was reported to have been most rapid in the east of the province, especially in the cities of Qingdao, Yantai and Donging. Obviously, given such rapid urbanization, the major task of the water supply companies has become to ensure that new residents (and industries) obtain access to water supply services. Reflecting the rapid pace of urbanization, the length of the

Figure 1: Location of Shandong Province in China

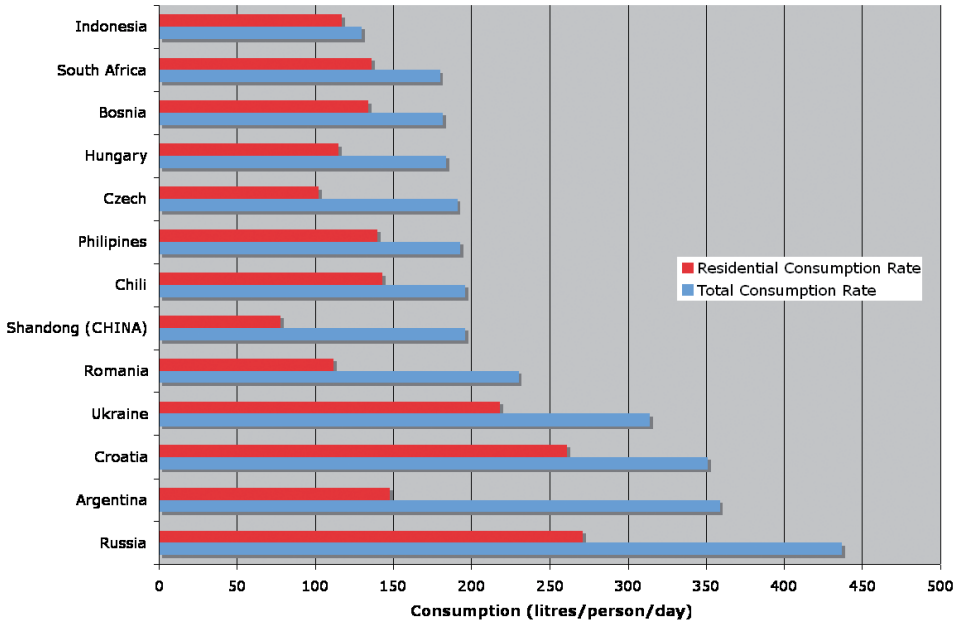


Figure 2: International comparison of per capita consumption rates (2004)

water supply network in the 30 water supply companies grew between 8 and 30 percent a year, with the highest growth rate registered in the medium-sized cities. As a result, the utilities participating in the benchmarking exercise were able to accommodate about 400,000 new consumers between 2003 and 2005.

All utilities reported very high rates of population per kilometre of network. All utilities served over 1000 people per kilometre with an average of 1300, and large cities served over 3000 people per kilometre of network. This high network density is a rather unique feature of the Shandong water supply systems. A few utilities in other countries, such as Vietnam, Indonesia and Zambia, also have high rates, but never does the average value of this indicator exceed 1000 people per kilometre of network. Compared with other large countries, these high density networks are unique. In Brazil, for instance, network density ranges from 300 to 700 consumers per kilometre of network in large metropolitan areas, while in Europe and Central Asia (ECA) network density is only about 200-300 consumers per kilometre in large cities. Such a high density of population puts Chinese utilities in a unique position: (i) they experience unprecedented economies of scale; but (ii) such high density can put stress on the water supply network and may require much more intensive maintenance and frequent replacement of the network.

Service coverage and water consumption

Over 2003-2005, there were no significant changes in water supply coverage in most cities. The 30 utilities in Shandong reported on average that 90 percent of the population was covered by piped water supplies. There are no standpipes or alternative water sources in the urban areas of Shandong. Despite the rapid urban growth, the utilities were able to keep pace with the influx of new consumers.

As well as being unique in its high network density, Shandong also displays some unique features in its consumption patterns. First, in all 30 water utilities the share of water consumed by residential users in comparison to industrial consumption is relatively low. On average only 45 percent of total water consumption is for residential use. In 20 out of the 30 utilities surveyed, less than 50 percent of water is consumed by residential users. As a consequence, residential water consumption per capita is also low. In 2005, residential water consumption was on average 82 litres per capita per day (lpcd), while overall water consumption in that same year amounted to 207 lpcd. From an international perspective such consumption and subsequent revenue patterns are relatively rare for utilities of this scale of operation. Similar examples can be found in several cities in Russia built around large industries, which usually are the owners of water intakes or wastewater treatment plants that serve both the industrial plant and the municipality.

Figure 2 presents an international comparison of per capita total daily consumption rates and per capita residential daily consumption rates. Shandong's per capita total daily consumption rate of around 200 lpcd is similar to the rates of consumption found in similar emerging economies. However, the province's residential consumption, which is around 80 lpcd, is well below the rates of peers shown below.

Water consumption patterns also vary significantly between cities in Shandong. In some cities, such as Shengliyoutian (oil refining centre of the province) and Rizhao, water consumption is as high as 334 lpcd and 514 lpcd, respectively. The ratios of industrial and commercial consumption to total consumption in each city are 58 percent and 70 percent respectively, which demonstrates that industrial and commercial water use does contribute significantly to high water production per capita.

Metering and Non-Revenue Water (NRW)

Because of the unique features explained above, regarding the high density water supply networks, the non-revenue water indicators show an interesting picture. The non-revenue water measured as a percentage is low compared to many other utilities in emerging markets at 21 percent (see Figure 3). Yet, the actual daily losses per kilometre of network are very high. Many of the water supply companies have high physical losses of around 50 to 90 m^3/km/day, with physical losses in the mega-cities of around 150 m^3/km/day. For comparison, in the United Kingdom this indicator is close to 10 m^3/km/day, and in Hungary it is 35 m^3/km/day. In Brazil, only Rio de Janeiro reports similar losses per kilometre of network, but this also corresponds to a much higher percentage of non-revenue water (about 55 percent).

As water metering is almost universal, the cost of water is low, and there are stiff penalties for consumers found to have illegal connections. While groundwater is available, the size of administrative losses is assumed to be manageable. Local water staff estimate that illegal water use is probably low and does not exceed five percent of total water production.

The network losses are more likely a result of the high population density. The high population density in Shandong's urban areas results in capital efficient distribution networks, but requires large diameter supply mains and high capacity water distribution networks that operate with high pressures and high volumetric flow rates. When leaks occur, the volumetric rate of water losses will subsequently be considerably higher than for low pressure and low capacity systems.

A major cause of physical leakage is pipe breaks. The mega-cities with extensive networks show a very low number of pipe breaks per year. This is presumed to be due the majority of the network being of recent construction. Among the medium-sized cities, Yucheng, Zhangqiu, Weihai, Jiaonan

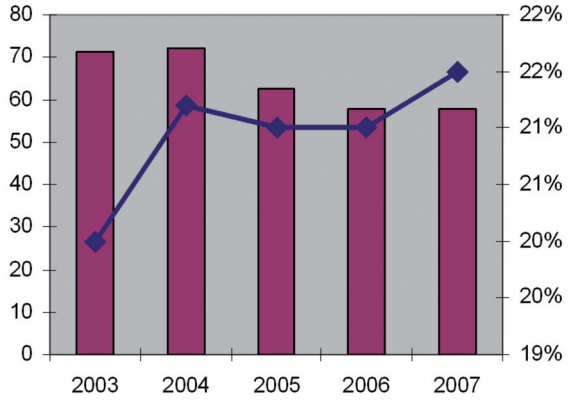


Figure 3: Shandong Non-Revenue Water as a percentage and in m^3/km/day

and Pingdu show relatively high numbers of pipe-breaks. Further detailed analyses of break-rates for different locations, materials, diameters or time periods laid have been recommended to identify common trends in the breaks and to develop a consistent remediation plan. Analysis of this data will allow for informed prioritization of future NRW reduction programmes.

Operating costs, revenues and cost recovery

The reported average operational costs in Shandong are low in comparison with other emerging economies, at around US$0.17 per cubic metre in 2003 and around US$0.21 per cubic metre in 2005. Such low values suggest that only certain operational and maintenance costs are being included in the reported cost of the water services. A major cost element that is not adequately reported is debt service. The lowest costs were reported in medium-sized cities.

In 2005 labour costs were on average 31 percent of reported operating costs and electricity costs were on average 25 percent of reported operating costs. The electricity cost ratio is higher in smaller cities. The staffing ratios of around 0.7-2.0 of staff per 1000 consumers are close to the levels reported from countries of the former Soviet Union. Staffing ratios are highest in small and medium-sized cities.

Average water revenue was US$0.17/$m^3$ in 2003 increasing to US$0.21/$m^3$ in 2005. Water revenue increased by around 10 percent per year. Small cities have lower revenue from water sold than medium-sized cities; but medium-sized cities have higher water revenues per cubic metre than large cities; this is contrary to the logic that larger cities can deliver more efficient services because of economies of scale.

As described previously, operating cost data is perceived to cover only certain recurring costs, as information on debt service costs is often omitted. The operating cost coverage ratio is based on the same incomplete data.

Around half of the water companies have sufficient revenue to cover their reported operating costs with the average Operating Cost Coverage above 1.0. However, if all operating costs are taken into account, then the Operating Cost Coverage is likely to drop below 1.0. The smallest water companies have the lowest Operating Cost Coverage ratios indicating that they have the lowest commercial sustainability and the greatest need for remedial measures and fiscal support. In many cases, partial recovery of recurring operational costs was achieved via substantial cross-subsidies from non-domestic consumers to domestic consumers. As was noted above, water revenues are not sufficient to cover the operating costs of small water companies. In contrast, larger water companies achieve cost recovery through price discrimination against industrial consumers. Smaller water companies are highly dependent on revenues from industrial users and so rarely have opportunity to discriminate against industrial users to generate a higher revenue. The highest cross-subsidy was reported by the industry-based Shengliyoutian Water Company of 'Victory' Oil LLC.

Affordability of water services

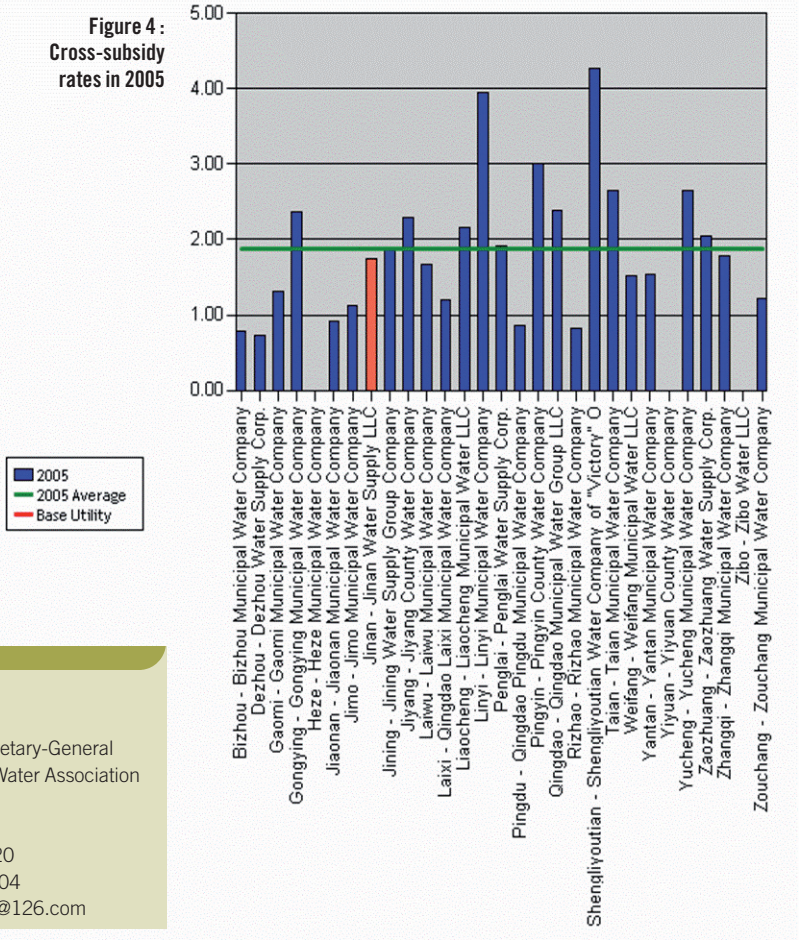
The annual household cost for consuming 6 m^3/month of water provides an indication of affordability and was found to be US$14.75 in 2005. This translates into an average annual household expenditure on water of less than 1 percent, which is considered to be an affordable service and is significantly lower than in many countries with similar Gross National Incomes per capita.

Average collection periods are reasonable, but as is discussed in the case studies, collection periods for domestic users may be considerably longer, suggesting that these reasonable average collection periods are achieved through early collection of industrial users' fees.

Conclusions

- The IBNET indicators survey proved to be an important tool for the assessment of water services in Shandong in China. The assessment survey provided management with indicators that measure business performance and provides new tools for monitoring and controlling future business performance. The survey highlighted good practices being implemented by the participating utilities and also highlighted areas of business where there is potential scope for efficiency gains. Because the benchmarking

Figure 4 : Cross-subsidy rates in 2005



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exercise was considered a useful tool, the SUWSA (with technical assistance from IBNET) embarked upon a second round that is currently on-going.

- The water utilities in Shandong have to deal with some very unique features that increase the need for efficient management and operation. First, urban population density is high, compounded by rapid urban growth. A primary challenge for all the water companies is the expansion of services to meet demand. Larger cities have been expanding their networks at around three to five percent per year. However, this challenge is considerably more difficult for smaller water companies, which are having to expand networks at up to 11 percent per year, but with considerably less access to fiscal subsidies and less power to ensure adequate revenues to cover expenditures.
- Non-Revenue Water as a percentage is low, due to the high population density in the utilities, service area and the recently installed distribution networks. However, actual physical losses (in cubic metres per kilometre) and number of breaks per kilometre of network resemble those of the poorer performing countries. Therefore, substantial efficiency gains are needed. These can be achieved through improvements in the operational management of the distribution network, such as pressure monitoring and pressure control, and through targeted non-revenue water reduction programs. Specific effort should be put into monitoring and recording incidences of pipe bursts in accordance with location, pipe material and pipe diameter.
- Up to 50 percent of potable water is consumed by non-residential users. In many areas these industrial and commercial users are receiving preferential services from water companies. At the same time, these industrial and commercial users also cross-subsidize domestic users. This specific feature may put pressure on the financial sustainability of utilities in Shandong, especially for smaller water utilities. Small water utilities are in a much worse financial situation than large and medium-sized utilities, as they may have fewer options than their peers in large cities to increase tariffs or impose cross subsidies while faced with the highest urban growth rates. ●

Benchmarking brings attention to Moldova's struggling water sector

In the years following the break up of the Soviet Union, Moldova has experienced an increase in economic growth, which in turn has affected its water sector. **IURIE NISTOR** discusses the role of the Moldova Apa Canal in provider performance assessment.

Moldova is located between the western border of Ukraine and the eastern border of Romania. It is a small country with a population of 4.3 million in 2000. About 40 percent of the population lives in urban areas.

The country has 32 'raions' (regions), three municipalities (Chisinau, Balti and Benderi), one autonomous territorial unit (Gagauz Eri), and one territorial unit (Transnistria). Each of the administrative units has its own water and sanitation department that supervises water operations. Water sector decentralization started in Moldova in 2000.

Water and sewerage services are provided through water and wastewater utilities (apa canals) in urban areas. In rural areas, a department under the mayor's office provides these services under the supervision of the Ministry of Agriculture. Of the water services providers, 27 are specialized water supply and sanitation utilities (apa canals), and 15 are communal multi-service facilities. Performance comparisons are made taking into consideration the size of the utilities.

Moldova went through a major economic transition when the Soviet Union broke up. Although the Moldovan economy experienced an average annual economic growth rate of almost seven percent between 2000 and 2006, Moldova still ranks low in terms of commonly used living standards and human development indicators in comparison with other transition economies. It remains the poorest country in Europe in terms of Gross Domestic Product (GDP) per capita, estimated at US$720 in 2004. In that same year, about 40 percent of the population lived below the poverty line.

The effects of these economic changes have reverberated strongly through the economy, and had major long-term consequences for the water and sanitation sector. The economic transition strongly affected production and consumption patterns, investment behaviour and cost structures.

The process of performance assessment

Performance assessment in the country is conducted by the Moldova Apa Canal (AMAC), the non-governmental association of water and wastewater services providers. Its members include all municipal utilities, six institutes involved in the water supply and sanitation investment designs, and several producers of water and wastewater equipment. AMAC has maintained a comprehensive performance database for all water and sewerage services providers over the period of 1996 to 2007. Twelve AMAC staff members provide technical assistance to the utility-members of the association, guide the water reform process, provide assistance with water supply and sewerage investment projects, and represent the utility members in relations with governmental institutions and local administrations.

The process of performance assessment started in 2001 when the *Water Performance Assessment Start-Up Toolkit* (a predecessor to the current International Benchmarking Network for Water and Sanitation Utilities (IBNET) Toolkit) was successfully tested in the country. Data were collected from all water and wastewater companies for the period of 1996 to 2000. The first study was conducted and financed by the Environmental Action Programme (EAP) Task Force of the Organisation for Economic Co-operation and Development (OECD). Later in 2004, when the World Bank introduced the IBNET toolkit, the data collection standard was adjusted to the new standard. Since then AMAC has been collecting data on an annual basis. AMAC was among the first agencies to publish its performance indicators on the IBNET website.

Twice a year AMAC conducts meetings on performance assessment and benchmarking with its members. In the first annual meeting, the data collection procedures are discussed. As the utilities have a lot of experience

with the general performance assessment procedures, this meeting focuses particularly on additional data to be collected. Afterwards, the utilities collect the data, which are subsequently sent to AMAC for review of their consistency and reliability.

When the data are considered reliable, they are entered into the official database. When there are concerns about the quality of the data AMAC staff visits the utility to resolve them. After all data are entered into the AMAC database, AMAC analyzes the data and produces benchmarking tables for each utility separately. At the second annual meeting the results of the analysis are provided to each utility.

On the basis of the results of that meeting, AMAC produces its annual report, which is shared with the Ministries of Finance, Economic Affairs and Trade, and other stakeholders involved in the sector.

Performance indicator results are consistently used for the evaluation of the reforms in the sector. Based on the indicators, the association developed recommendations for the government. The AMAC database was used in the selection of the utilities to be funded through World Bank loans and in the prioritization of the donors' interventions and technical assistance.

Interestingly, the experience of AMAC with performance assessment and benchmarking in the sector has had an impact beyond the country itself. In 2005 the Romanian Water Utilities Association asked AMAC to assist them when they started the process of benchmarking. AMAC was instrumental in assisting its Romanian counterparts in understanding the process of setting up a similar performance assessment and benchmarking system.

Results of the IBNET performance studies

Because AMAC has been collecting data since 2001, it has a database that allows for some long-term analysis as it includes information from 1996 to 2007.

Service coverage

Service coverage has fluctuated over the past 11 years. Small utilities were the most affected by the financial and technical difficulties during the economic transition. Two small water companies, Cojusna and Anenii Noi, had to cease operations due to these difficulties. The populations of these small towns had to switch to wells and water tankers. Other small utilities reduced the level of services to a minimal level of six to ten hours of operation a day. In recent years, the situation has improved nearly

Figure 1: Water consumption, lpcd

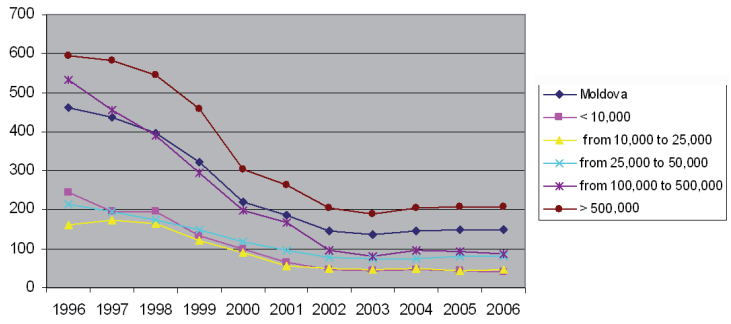


Figure 2: Unaccounted for water, %

everywhere. However, many small companies are still behind.

Wastewater service coverage is even worse. It fell in medium cities and is only 30 percent in small towns. Most improvements took place in Chisinau, the capital of Moldova.

Water production and consumption

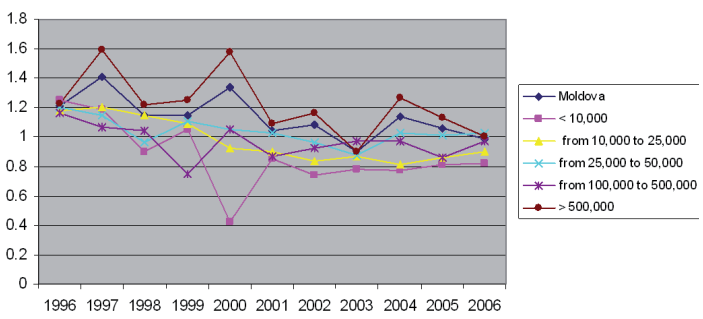
Overall water use declined considerably in Moldova during the past decade as a result of the economic restructuring. Total volume of water produced declined considerably from 453 liter per connection per day (lpcd) in 1996 to 158 lpcd in 2002. Since then it has more or less stabilized. The decline was a direct result of the sharp decline in demand for water supply and sewerage services in all customer categories. The decline in demand was especially significant for industrial water users. The share of industrial water users in total water consumption declined from 29 percent in 1996 to 20 percent in 2006. The reduction of industrial output due to the economic transition was the key factor explaining faltering demand. Yet, the high levels of cross-subsidization in combination with increasing water rates forced the remaining industries in later years to develop their own water supply systems – permanently dropping out of the piped water supply systems.

Demand from residential consumers also dropped significantly in the past decade. Between 1996 and 2006, average residential consumption per capita declined from an average 328 lpcd in 1996 to 110 lpcd in 2006. The sharp decline in residential consumption shows that household consumer behaviour has been significantly affected by changes in prices (due to an increasing number of households charged for their consumption on the basis of water meters, and an increase in the residential water tariffs). As theory assumes that household income is also a factor affecting the demand for water supply services, it is likely that the adverse economic conditions in the country contributed further to the decline in water demand.

Water and wastewater network performance

Non-revenue water indicators reflect the poor status of the water supply networks in the country, as they correspond with the levels of pipe break rates on the water supply networks. These levels are not only very high compared to other countries in

Figure 3: Operating cost coverage



Benchmarking for Pro-Poor Water and Sanitation Services Provision: an Emerging Indicator Framework

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Abstract
The Joint Monitoring Programme (JMP) that regularly reports on access to improved services finds that the expansion of water supply services is generally on track whilst sanitation is lagging much behind. Nearly all those that are un-served are disadvantaged, poor people in the urban and rural areas in developing countries. Water utility benchmarking has been promoted in the past decade, however, it is mostly focused on efficiency and service provision to existing customers, and does not take into account the provision of services to the unserved poor. The goal of the PROBE research project is to improve the existing benchmarking tools to allow utilities and other stakeholders to develop a stronger focus on service provision to the poor. The research aims to identify indicators for pro-poor services provision; appropriate incentive systems; methodologies for the mapping of the poor; leading practices; and to develop a dedicated toolbox. The research project is being implemented by 2 PhD and about 15 MSc students, through a collaboration of 8 academic and 9 professional institutions on 4 continents. At this time six MSc theses have been completed. These included three studies on indicators, one on incentives and two on leading practices. The innovative aspect of this research is that whilst founded on regular water utility benchmarking and its systems and tools, it is developing in a direction where the anticipated pro-poor benchmarking system will not only focus on the actual performance in pro-poor services delivery but will also address the enabling actors, processes and systems that are considered to be instrumental in the sustainable provision of drinking water and sanitation services to the urban poor.

Keywords
benchmarking; drinking water and sanitation; urban poor; informal settlements; improved services

Background

When the United Nations adopted the Millennium Development Goals (MDGs) in the year 2000, they gave an enormous boost to poverty eradication by quantifying goals and targets that are to be achieved by 2015. The MDGs also include specific targets for the improvement of water and sanitation services coverage. The Joint Monitoring Programme (JMP) of WHO/UNICEF that regularly reports on access to improved services finds that the expansion of water supply services is generally on track whilst sanitation is lagging much behind. Nearly all those that are un-served are disadvantaged, poor people in the urban and rural areas in developing countries, particularly in Asia and Sub-Saharan Africa, as evidenced by several JMP reports showing that the poorest quintiles are left far behind in getting access to improved drinking water and sanitation (WHO/UNICEF, 2010).

Benchmarking was defined by various authors, such as Boxwell (1994): “is about setting goals by using objective, external standards and learning from others, with the emphasis in learning “how” rather than “how much”, and Cabrera at al. (2011): "is a tool for performance improvement through systematic search and adaptation of leading practices". Both definitions suggest that performance improvement can be achieved by systematically learning (as opposed to copying) from others. Benchmarking can be seen to consist of two distinct steps or phases, one of comparative performance assessment, followed by performance improvement where leading practices found elsewhere are adapted and incorporated in business operations. Benchmarking originated as a strategic tool to stay ahead of competitors in the manufacturing industry in the 1970s. The original alignment with shareholder interests delivered four typical benchmarking perspectives: Finance, Customer, Internal business, and

Innovation and learning. These perspectives, the desired values of related performance indicators and related measures were brought together in a single table, the Balanced Score Card (Kaplan and Norton, 1992). Off late, the conventional shareholder focus is being adapted to reflect broader stakeholder interests, introducing social and environmental perspectives and related indicators (Hubbard, 2006).

Benchmarking in the water supply and sanitation sector is being promoted as a low-cost and effective tool to assist the improvement of water utility performance. However, current benchmarking appears focused on efficiency and service provision to existing customers that benefit from piped services. Water utility benchmarking started in the 1990s and is now a rather common, worldwide activity. The International Water Association (IWA) has played a key role in promoting benchmarking by producing separate manuals for water utilities (Alegre et al. 2006) and for wastewater utilities (Matos et al. 2003). IWA stresses the need for integral performance assessment including four main perspectives (Finance, Customer, Processes and learning, Growth) similar to the Balanced Score Card. Water utility benchmarking is being carried out worldwide. The most recent IWA publication on benchmarking water services (Cabrera et al. 2011) provides information on benchmarking efforts in Australia (42 utilities), Austria (100 utilities), Canada (45 utilities), Germany (45 utilities), India (400 utilities), The Netherlands (45 utilities), the USA (100 utilities), and also highlights regional benchmarking initiatives in Europe (45 utilities from 21 countries), Scandinavia (6 utilities in 4 countries), Southeast Asia (90 utilities in 5 countries), Latin America (100 utilities in 16 countries). On a yet larger scale, the IBNET is a global initiative with more than 2000 utilities in 85 countries (www.ib-net.org).

Research Project

PROBE, the research project that is being implemented by a partnership of which the author is the Team Leader is aiming to adapt and apply the existing benchmarking tools in support of the achievement of MDG targets 10 and 11, and more specifically to use it to promote the accelerated expansion of drinking water supply and sanitation services to the urban and peri-urban poor. The goal of the research project is to propose improvements to the existing benchmarking tools to allow utilities and others to develop a much stronger focus on service provision to the poor.

The research project is now being implemented in 5 countries and is a collaboration of 8 academic and 9 professional institutions among which are water utilities and regulators[1]. The research is being carried out by PhD and MSc students. Most of them are developing country nationals with extensive working experience in the water sector. The dissemination of research results is foreseen in academic ànd professional environments, with an expected 2 PhD theses, 20 MSc theses, and about 30 publications including working papers, conference proceedings and journal articles. Professional dissemination will be through IWA conferences and workshops, other water conferences and events[2], and, if the results are interesting and applicable, through a dedicated IWA pro-poor benchmarking manual or toolbox.

The PROBE project seeks to expand the current research on water utility benchmarking by

[1] Academic partners: UNESCO-IHE (Netherlands), USP and UFC (Brazil), KNUST (Ghana), Makerere University (Uganda), University of Zambia (Zambia), PWUT (Iran), CEPT (India). Professional partners: SABESP, ARSESP, ARCE (Brazil), NWSC (Uganda), NWASCO (Zambia), NWWEC (Iran), IWA and Vewin (Netherlands), Suez Environnement (France).

[2] Presentations included the IWA World Water Congress and Exhibition in Montreal (2010), the IWA PI-2011 conference in Valencia (2011), and the World Water Week in Stockholm (2011).

specifically incorporating the dimension of service provision to the poor in the urban and peri-urban areas. The subject of pro-poor water and sanitation services itself is not new. Experience and research spanning several decades have shown that the provision of sustainable services to the urban poor requires an integrated approach by the utility and other actors including the resolve to supply services to the poor in informal areas, pro-poor technology choice, issues of affordability to be addressed, and last but not least, effective and innovative institutional arrangements. It is the view of the PROBE project that if all these actors and factors are indeed necessary ingredients for successful services provision, then they should be incorporated in a comprehensive benchmarking system. Only a system developed along these insights will actually be able to gauge if in a particular urban environment all institutions, organisations, systems and processes are in place and equipped to enable the provision of water and sanitation services to the poor. In addition to these enabling variables that would measure the degree of readiness of utilities and other stakeholders to provide services to the poor, the PROBE project wants to include benchmarks that show the actual quality of the water and sanitation services that are being provided to the dwellers in informal settlements and slums. Finally, in addition to the development of an *assessment* system to gauge readiness and ability to provide services, and in full conformity with the concept of (water utility) benchmarking the PROBE project wants to develop a performance *improvement* system to promote improved services provision to the poor through the study, discussion and exchange of leading practices covering all aspects.

The PROBE research has identified the following distinct areas of investigation:
1) the development of a system of performance indicators and enabling or contextual indicators dedicated to the sustainable provision of improved drinking water and sanitation services to the urban poor;
2) the identification of incentive systems that promote the accelerated provision of pro-poor services;
3) the development of a low-cost methodology for the mapping of the urban poor in a given geographical area, for the specific purpose of supporting the provision of pro-poor services;
4) the identification and categorisation of successful practices for pro-poor drinking water and sanitation services provision;
5) the development of a toolbox or manual that includes pro-poor indicators and incentive systems, pro-poor mapping tools, and case studies and tools for pro-poor services provision.

Research results

Initial research has been carried out in the area of indicator development, incentive systems, and leading practices resulting in six MSc theses. Among these six theses there were two desk studies and four field studies. Three theses were on indicators including two based on fieldwork in Kenya, and in Zimbabwe and South Africa. Two theses were on leading practices of which one based on fieldwork in Uganda; and one thesis was on incentive systems based on fieldwork in Brazil. This paper will deal with 4 studies specifically whilst taking note of some of the findings in the other two.

One study on successful pro-poor projects was by Olatunji (2010), from Nigeria. He studied a host of background documents on pro-poor experiences and some 50 case studies, and reported on the incidence of actors and factors that appeared to make these pro-poor projects successful. Among others, his findings are that among nine key actors the five most visible are the municipality, the users, the supra-municipal actors (e.g. the national government), the

NGOs/CBO and the utility. Similarly, among nine key factors, the five that prevail most are financial mechanisms, governance, user involvement, technology and institutional and legal mechanisms.

Another study was on perspectives and indicators for pro-poor services provision. This study was carried out by Alden Sanchez from Guatemala (Sanchez Ralda, 2010). He studied the literature on private and public sector benchmarking and on water utility benchmarking in particular. He found that the approaches defined for use by the private sector have in many cases been adapted, expanded and applied by the water utility sector. The perspectives and indicators being used in the water services sector are increasingly being selected and modeled after the IWA guidelines that offer hundreds of performance and contextual indicators (Alegre et al., 2006, Matos et al., 2003). He also found that the perspectives and indicators that are commonly used in water utility benchmarking do not lend themselves well for establishing progress in providing access to improved services by the poor. Using his own work and that of his colleagues, he proposed an initial set of five perspectives and thirteen indicators that would provide a better insight in pro-poor services provision. The perspectives differ from the original set of perspectives used by Kaplan and Norton for use by private firms, and also from those by IWA, Vewin and others for use by water utilities (Water Utility Management, 2008). The proposed perspectives have borrowed from those, but also took guidance from the somewhat different perspectives used for performance assessment of water resources organisations (Hooper, 2006). This latter orientation has also brought in the indicators that measure the quality of enabling processes and systems. Finally, because of the institutional complexity of pro-poor services provision, the perspectives and indicators also probe the performance of other key actors. The five perspectives include Policies, arrangements and capacities (with three indicators: political initiative and support, capacity of the regulator, capacity of the service provider); Collaboration (two indicators: inter-agency collaboration, end user involvement); Tools (four indicators: mapping the poor, pro-poor financial instruments, pro-poor technologies, pro-poor incentives); Sustainability (two indicators: innovation and learning, durability); and Service provision (two indicators: quality of pro-poor sanitation services and ditto for drinking water services).

Table 1. Proposed perspectives and indicators for assessing the provision of water and sanitation services to the urban poor

Perspective	Indicator	
Policies, Arrangements and Capacities	1	Political initiative and support
	2	Capacity of the Regulator / LGO
	3	Capacity of the WSS service provider
Collaboration	4	Inter agency collaboration
	5	End user involvement
Tools	6	Mapping the poor
	7	Pro-poor financial instruments
	8	Pro-poor technology
	9	Pro-poor incentives
Sustainability	10	Innovation and learning
	11	Durability
Services provision	12	Quality of pro poor sanitation services
	13	Quality of pro poor water supply services

Subsequent research by Mutai (2001) and Ndlovu (2001) took the indicators system forward by developing the content for each of the indicators, by proposing a methodology for data collection, by developing a scoring system to assess the field data and by field testing the system in Nairobi, Kenya (Mutai), and in Bulawayo, Zimbabwe and in Pietermaritzburg, South Africa (Ndlovu). In parallel, Murungi (2011) carried out a case study of leading practices in pro-poor services provision in Kampala, Uganda and used the system of perspectives and indicators - rather than its specifics - as a framework of analysis for her findings.

Concerning the more detailed definition of the indicators, each of them is in fact made up of several items on which information needs to be collected from a variety of information sources, including documents, data series, interviews, questionnaires and observations. These items would, after processing, provide a value for the indicator. Indicators 1 to 11 are process-type, contextual indicators, whilst indicators 12 and 13, about the quality of service provision are output-type, performance indicators.

Table 2. Assessment framework

Perspective		Indicator		Items	Criteria
1	Policies, Arrangements and Capacities	1	Political initiative and support	3	12
		2	Capacity of the Regulator / LGO	3	12
		3	Capacity of the WSS service provider	3	12
2	Collaboration	4	Inter agency collaboration	2	8
		5	End user involvement	2	6
3	Tools	6	Mapping the poor	1	4
		7	Pro-poor financial instruments	3	12
		8	Pro-poor technology	1	4
		9	Pro-poor incentives	-	-
4	Sustainability	10	Innovation and learning	2	8
		11	Durability	-	-
5	Services provision	12	Quality of pro poor sanitation services	5	8
		13	Quality of pro poor water supply services	8	9
5		13		33	97

Concerning the more detailed definition of the indicators, each of them was developed further into a number of items and for each item into a number of criteria. These items and criteria were generally sourced from the literature on leading practices, and where possible were kept simple and easy to establish. The 13 indicators can be distinguished in two groups where indicators 1 to 11 concern enabling, contextual parameters with indicators that are mostly of a qualitative nature, whilst indicators 12 and 13 are about the actual quality of pro-poor services with indicators that are mostly on output or performance, and more of a quantitative nature. By way of example, enabling indicator 1 - Political initiative and support, was developed to comprise six items including item i) Pro-poor watsan policy; item ii) Pro-poor watsan legislation and/or regulation; item iii) Specific targets and programs for the provision of pro poor watsan services; item iv) Significance of financial allocations for pro-poor watsan provision from the central/local government; item v) Specific organisational arrangements in place for pro-poor watsan services in central/local government; item vi) Government initiatives to enable stakeholders to engage in pro-poor watsan provision. For item i) Pro-poor policy, there are four assessment criteria: a) the policy assigns specific priority to services

provision for the poor; b) the policy has a component on water supply and sanitation services for the poor; c) the policy has community involvement and gender components; and d) the policy includes financing mechanisms for pro-poor watsan services provision. By comparison, indicators 12 - Quality of pro-poor sanitation services was developed to include items covering i) Distance to the service; ii) Technology; iii) Quality of the service; iv) Covenience of the service, and v) Affordability of the service. All in all, the 13 indicators have 30 items and a total of 97 assessment criteria.

The above system was field tested in a number of slums and informal settlements.
Information on the indicators was collected from documents, semi-structured interviews, focused group discussions and questionnaires covering key stakeholders such as the service provider, the municipality, relevant ministries, trusts active in the watsan sector, (I)NGOs and CBOs, community leaders and representatives, local politicians and officials and slum dwellers.

The outcomes thus obtained were then used to quantify the indicators. The system that was tested for the quantification of the process-type indicators assesses the evidence collected for each item. Taking the example of the Pro-poor policy, in case there is no policy, the score is 0. If there is, the next step is to assess the quality of the policy, leading to an outcome that could very between 1 = limited or poor, and e.g. 4 = complete or good. The score was then determined by simply looking at the outcome of the assessment of the policy document along the various criteria, where the score for each criterion could be either 0 or 1 (table 3). The same systematic was applied to the indicators that yielded quantitative outcomes, notably indicators 12 and 13. Here the outcomes were held against a(n arbitrary) benchmark with the aim to also here come up with a score 0 or 1, where a score of 0 show under-performance relative to the benchmark and 1 show over-performance (table 4).

Table 3. Example of the outcome and scoring of the qualitative indicators

Perspective 1: Policies, strategies and capacities Indicator 1: Political Initiative and support Item 1: Existence of pro-poor WSS policy		
Criteria: the policy		Score
1	elaborates specific priority to pro-poor watsan services provision	0/1
2	has a component on water supply and sanitation services provision to the poor	1/1
3	has community participation and gender components	1/1
4	includes financing mechanism for pro-poor WSS services provision	1/1
Total score		3/4

The same systematic was applied to the indicators that yielded quantitative outcomes, notably indicators 12 and 13. Here the outcomes were held against (an arbitrary) benchmark with the aim to also here come up with a score 0 or 1, where 0 would signify that the outcome was showing a performance below the benchmark and 1 would be better than the benchmark (table 4).

Table 4. Example of the outcome and scoring of the quantitative indicators

Perspective 5: Service Provision Indicator 12: Quality of sanitation services Item		Unit	Bench mark	Value		Score	
				Slum 1	Slum 2	Slum 1	Slum 2
1	Distance to the service	m	50	21	75	1	0
2	Facility is an improved technology Facility only for single family use	%	90	100 2	80 0	1 0	1 0
3	Facility is clean Facility has no offensive smell	%	75	77 30	64 32	1 0	1 0
4	Facility is accessible to disabled persons Facility is safe for nightly use by women	%	75	0 77	0 50	0 1	0 0
5	Affordability (not investigated)	-	-	-	-	-	-
Total score						4/7	2/7

Note: the benchmarks for items 1 (distance) and 2 (coverage) are local benchmarks, the other two are arbitrary

The findings thus obtained were then collected in one overview that provided an overall picture of the status of the enabling indicators and the actual quality of services in the slums, as show in table 5. For benchmarking purposes the outcome of the assessment component would show strenghts and weaknesses, that could in a next phase of benchmarking, that of performance improvement lead to exchange of information in the form of processes, experiences, etc.. between stakeholders from different localities (operating under the same national cover) or even different countries (with a different enabling environment).

Table 5. Summary table showing the outcome of the assessment for all indicators

Perspective	Indicator		Score	
			Slum 1	Slum 2
Policies and capacities	1	Political initiative and support	3.7/4	3.7/4
	2	Capacity of LGO/Regulator	2.7/4	2.7/4
	3	Capacity of WSS providers	2.5/4	2.5/4
Collaboration	4	Inter agency collaboration	3.5/4	3.5/4
	5	End user or Community participation	0/2	1/2
Tools	6	Mapping the poor	0/4	0/4
	7	Pro-poor financial instruments	2/4	2/4
	8	Pro-poor technology	2/4	1/4
	9	Pro-poor incentives	-	-
Sustainability	10	Innovation and learning	2.5/4	2.5/4
	11	Durability	-	-
Services provision	12	Quality of pro-poor sanitation services	4/7	2/7
	13	Quality of pro-poor water services	6/8	6/8

Note: the score shows the actual outcome against the maximum score that could be obtained

Another, more direct use of the outcome could be to find causal relationships that would explain the actual quality of provision of services, and differences in quality between water and sanitation services or between slums. The differences between the quality of water services on the one hand and sanitation services on the other in the same slum could not be explained by outcome of the assessment. Likewise the framework does not show causality between service quality differentiation between the slums. This implies that the framework of

indicators failed to capture aspects that apparently influence the quality of water and sanitation services provision. The same study (Mutai, 2011) and another one by Murungi (2011) concluded that the present framework fails to capture socio-political and other dynamics that take prevail in the slums and provided some evidence of events (e.g. a water-related disease outbreak) and political capture that enabled, respectively disabled concerted efforts to improve services provision in the concerned slums.

The different data collection methods used in the research enabled the triangulation and confirmation of the information. However, some of the secondary data proved incomparable with those from surveys and field observations. Also, the researchers questioned if their findings could be replicated by others, as they felt there to be scope for subjectivity in the assessments and scoring.

Conclusion

The innovative aspect of this research is that whilst basing itself on the regular water utility benchmarking and its systems and tools, it is developing in a direction where the anticipated pro-poor benchmarking system will not only measure performance in services delivery but will also propose to measure the progress made in establishing the enabling processes and systems that are considered to be inevitable components of a successful drinking water and sanitation services provision to the urban poor.

The establishment of the perspectives and indicators is ongoing and present research shows that some indicators have been overemphasized whilst others may need to be added. Similarly some of the items may need modification. The system for assessing and scoring the enabling indicators is feasible but will need refinement. The expected correlation between the enabling indicators and the performance indicators that measure the actual quality of services in the urban slums is provision is not satisfactory, confirming the need to improve the set of indicators.

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Population range	Classification/name of the city	Number	Total population
10,000	Rural	12	65,000
10,000-25,000	Small cities	21	435,000
25,000-50,000	Medium-sized cities	4	200,000
165,000	Balti (large city)	1	165,000
660,000	Chisinau (capital)	1	660,000
Total		**39**	**1,525,000**

Table 1: Distribution of population among municipal utilities, Moldova Apa Canal (AMAC) members

the region, but they continue to increase. Recent studies of the Moldovan water supply and sewerage sector mention a lack of investment and the absence of systematic maintenance of water supply and sewerage systems. Given the average network age of 25-30 years, this has resulted in significant reduction of service levels, sometimes resulting in the closing down of specific parts of the networks (the latter actually amounts to a 'dis-investment' in the system). This effect has been especially noticeable in the sewerage sector. As a less critical basic need than water supply, the sewerage sector was the first victim of the reduction in service levels, and in more extreme cases, the closing down of service delivery. As a result, raw water sources have become increasingly polluted, with those wastewater treatment plants still operating using only mechanical treatment in order to save costs.

The situation is especially critical in smaller utilities where non-revenue water as a percentage of production is increasing rapidly. The major reason for the poor performance of smaller utilities is that they have been mostly left out of any government investment and rehabilitation programmes, which have especially benefited the larger utilities. As smaller utilities already have a smaller customer base, they are prone to end up in a vicious circle. These utilities face ballooning maintenance costs due to the aging of the system exacerbated by a lack of maintenance. They cannot fund these increasing maintenance costs out of their revenues and are increasingly unable to provide a reasonable level of service. This results in measures, including the reduction of the hours of service, which in turn has a detremental effect on the revenue base of these smaller utilities.

Financial performance

Under Soviet rule, Moldova's electricity prices were heavily subsidized. With the liberalization of the electricity market, the cost of providing water supply and sewerage services grew rapidly. Between 1996 and 2007, the operation and maintenance cost for water supply and sewerage grew by 3.2 times in constant US dollars. At the same time, the average tariff increased by only 2.6 times. This represented a major price increase for consumers who reacted by reducing their consumption drastically. As a result, the operating cost coverage ratio has fluctuated very close to 1.00 – meaning that the utilities can cover their basic operation cost but little more. The limited financial viability of the sector has been associated with the rapid growth of operating costs (especially energy costs), and constraints to increasing water and sewerage tariffs (as sharp increases in the past have resulted in a very significant decline in the demand for water and sewerage services). Yet, there are large variations in the level of financial stress among different utilities. The major problems of financial viability are faced by the small utilities that are not solvent and rely on state support as they lack access to financial markets.

As a result, the utilities in Moldova find themselves in a difficult situation. Increasing revenues any further may cause another decline in water consumption. This is especially an issue because in some smaller systems, the actual water consumed has reached levels that may raise public health concerns. Two of the water utilities already produce less than 40 litres per capita per day, which the World Health Organization considers the minimum required for public health safety. Another five utilities are getting very close to those levels, all of them small utilities. Yet, without more cost recovery the process of utilities finding themselves unable to undertake proper maintenances because lack of funds, and hence seeing their service levels deteriorate, further affecting their capacity to generate revenues.

Cross-subsidy from industries to residential consumers dominates the national tariff policy. Balti was the only city with a uniform tariff in 2007. On average, the effective tariff for industries is six times the tariff for residential consumers. This is less than in 1996, when this indicator value was close to 10. Cross-subsidies may help residential water consumers, but are likely to have a negative impact on the consumption of non-domestic water users. In addition, as the problems are most severe in small utilities, it is unlikely that increasing cross subsidies will boost overall revenues, as such systems rely mainly on residential consumers.

In addition, even though tariffs have increased over time, billing and collection indicators show rather adverse trends. The collection period is almost one year (353 days), with even longer collection periods in the capital city of Chisinau. As utilities are not allowed to disconnect non-paying customers, it is quite likely that tariff increases have largely translated into higher levels of non-payment.

Conclusions

The experience of benchmarking in Moldova shows that it has become a key tool in developing water supply and sewerage sector strategies. After seven years of experience, the basic IBNET Toolkit indicators have shown their value, while AMAC has started to supplement the original data collection tool. The major additions focus on energy conservation actions and environmental performance. These are major issues in the Moldovan water sector as rapidly increasing energy costs have resulted in a sharp increase in the cost of service, while the lack of investment in the sector over the past decade has resulted in higher levels of water pollution due to a decline in the efficiency and effectiveness of wastewater treatment plants.

In addition, the analysis of the data collected also shows the often long-term impacts of the major economic changes that have taken place in Moldova in the past two decades. Although growth rates have resumed, the many years of underinvestment, the explosion of the costs of service provision, and the constraints in the willingness to pay for water supply and sewerage services of a relatively poor population put major pressure on the financial viability of the networks that were built in the past. The problems have already resulted in the closing of two water supply networks of which one resumed operations a year after closing. In the short to medium term, the potential for cost recovery will be limited and a level of subsidization will be required. ●

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