Benchmarking management of sewer systems: more to learn than cost effectiveness

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Abstract Thirty-nine municipalities in the Netherlands conducted a pilot study to develop and try out a methodology to compare the quality of their sewerage management. The participants chose a multidimensional benchmarking with an emphasis on the aim of improving the working processes within sewerage management. A second goal was accountability to the stakeholders. The benchmarking methodology was based as well on analysing data within a "balanced-score-card" system as on intensive exchange of knowledge and experiences. The pilot resulted in a state of the art overview of the quality of sewerage management in the Netherlands. However, above all, it resulted in the shocking fact that the work is carried out in many different ways which cannot be explained by technical reasons or local circumstances. To pinpoint best practices and actually implement these improvements the learning process must continue after the analysis and presentation of the data. A start has been made to form regional specialist networks for further discussion and exchange of experiences.

Keywords Balanced score card; benchmarking; management; municipalities; performance indicators; sewer systems

Introduction

Organisation of water management in the Netherlands

The management of water in the Netherlands is divided among several public bodies and (partially) privatised organisations. Following the water cycle, about 17 public-owned companies supply industrial and tap water, 483 municipalities take care of the collection and transportation of wastewater as well as urban drainage, 27 water boards operate wastewater purification plants and discharge effluent in surface waters which are managed by either a water board or by the National Water Authority in the case of the larger rivers and seas.

Management of the sewerage systems is best conducted by the municipalities because of the strong relationship with control of spatial planning and management of the physical urban environment. Sewerage management in the Netherlands means asset management by maintaining the quality of the physical sewer systems, administrative management including planning and optimising the whole system within the urban environment as well within the regional (waste) water system. Thus, this includes urban drainage as long as it is placed between the drainage of public premises and the surface waters managed by the water boards. In the Netherlands sewerage management is a 100% public responsibility by law.

Begun in the late nineteenth century, today the Dutch municipalities total to 80,000 kilometres of sewers. Yearly costs are approximately 1 billion euros (0.8 billion US dollar) partially financed with an annual average contribution of 120 euros for an average household. Politicians, always keen on cost reduction, stress the apparent differences between the amounts of these contributions amounts varying as much as a factor of 6 from one municipality to another.

Municipalities are keen to know the quality of their sewerage management. Is it as it should be, or can it be changed or improved? If so, in which aspects and how? The answer has been found by looking at other municipalities. How do they operate, but, above all, what can they learn from each other? To find out, the sewerage management in 39 municipalities has been benchmarked in a pilot project (Stichting RIONED, June 2003).

The aim of the project was to develop and test a methodology for comparing the quality of sewerage management in such a way that the participating municipalities obtain ideas for improvement of their working processes. The pilot also addresses the problem of finding the right balance between accountability and learning potential of benchmarking.

Of course, problems are different depending on the vulnerability of receiving waters, age of the assets or the way these assets have depreciated. However, the benchmark pilot has shown that most of the differences originate in the way sewerage management is conducted. This means there is a lot to learn with benchmarking, especially more than just cost-effectiveness.

Methodology of the benchmarking pilot

Historical background

In the 1980s, sewerage management attracted political interest. Statutory guidelines were introduced, such as the obligation to formulate a Municipal Sewer Scheme (sewerage plans). Sewerage became a fully fledged discipline.

In the year 2000, municipalities asked the RIONED foundation to carry out a benchmarking of their sewerage operations to enable them to improve the quality further. This resulted, in 2001, in a feasibility study into benchmarking among six municipalities. The findings were so positive that a large pilot was set up. The intention was to limit this pilot to 25 municipalities, but as more municipalities applied to be included, the total number amounted to 39. The partipating municipalities manage about 25% of the Dutch sewer systems. They have a total of 4.2 million inhabitants, almost 2 million sewage connections and 20,000 kilometres of sewers.

Goal and character

The goal of benchmarking the management of sewer systems is primarily improvement of the working processes. In the characterisation as used by Tillema and Van Helden (2003) the pilot was a comprehensive benchmarking with an emphasis on improvement (see Figure 1).
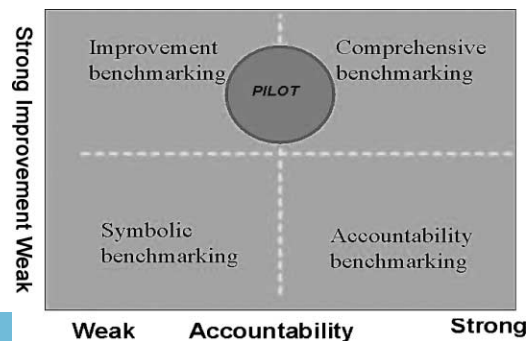

Figure 1 Nature of benchmarking

The character of a benchmarking process is defined by the degree to which the aim is either more accountability or more improvement. With the focus on improvement or accountability pur sang, the methodology has to be identical. If neither improvement nor accountability is in focus the benchmarking process becomes symbolic. Striving for both aims more or less equally defines the benchmarking as comprehensive. In the Dutch pilot project the aim gradually shifted from an improvement benchmarking to a comprehensive benchmarking. The reasons for this development were growing confidence in the figures presented as well as the understanding that differences can be explained and be accounted for. This change in attitude made it possible to publish the main results as a state of the art report on the quality of sewerage management in the Netherlands. Some of the results are published in a public report but most are worked out in detail in confidential reports, one for each participant. The results are discussed later.

Process and organisation

The participants in the benchmark came together at three meetings. The start-up meeting was held on 13 September 2002. At the first meeting aims and expectations were exchanged and methodology and approaches of stakeholders were discussed. The initial results were discussed in a workshop on 19 February 2003. After a final meeting for the participants, an umbrella report was presented on 25 June 2003. The enthusiasm of the pilot participants grew during the course of the project: a traditionally literally invisible discipline started to become increasingly visible.

The project was organised around four groups:

(1) The participants formed expert groups to discuss among other things the definitions, performance indicators, suggestions for presenting the coming results.
(2) A steering group with municipal authorities and ministerial representatives to decide on the major items.
(3) A project group for the daily management of the project.
(4) A sounding board of external stakeholders such as consumers, industry, water boards and national government.

Being a bottom-up driven pilot project the municipalities themselves had the largest say in the organisation.

After the second meeting, a small number of municipalities formed three learning platforms, to find out where they differed in the aspects of "dealing with the country side" and "inspection and cleaning". A regional group also started working with the pilot results.

The cooperation and exchange intended to improve the sewerage systems can best be realised in small, regional or thematic groups of municipalities. There is a great need for national standards regarding what "good" sewerage management entails. Phased improvement using benchmarking seems a sensible way to realise this goal and the sector will therefore be going ahead with such a method.

Balanced score-card with five perspectives

The benchmark was set up from both data gathered at each municipality and exchange between the municipalities at the meetings. After the start-up meeting, the researchers visited all the participating municipalities and gave them a questionnaire. This was completed and then discussed, so any ambiguities could be clarified. The data were analysed and compared on five perspectives. These perspectives form the link between the interests of the internal and external stakeholders.

The five fields of interest are not only chosen from the point of governmental interest but also for the purpose to link them to the primarily working processes within the

Table 1 Examples of some performance indicators for each perspective

Perspective	Critical performance indicator	Underlying indicators
Condition and functioning of sewer system	• Insight in quality of assets	• Percentage inspected sewers
	• Hydraulic and environmental problems	• Age of sewer system
Environmental efforts	• Percentage realised measures needed for lawful efforts	• Percentage unsatisfactory CSOs
		• Number of not connected households
Daily expenditure	• Yearly costs inhabitant	• Costs of cleaning, inspection[1]
Organisational capacity	• Realisation of schemes versus level of activities	• What is realised of the schemes
	• Good housekeeping	• Person-years per inhabitant
	• Efficiency in realising sewerage schemes	• Exceeding in time or costs
Nuisance and complaints	• Number of complaints versus time to react	• Per inhabitant, per km sewer
		• Time of first reaction, time to fix the problem

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management of the sewer systems. The following five perspectives are determined to be achievable items to compare:

(1) *Condition and functioning:* the image the municipality itself has of the quality and functioning of the sewer system.
(2) *Environment:* what efforts in its sewerage management does the municipality make for the environment?
(3) *Expenditure:* what does the municipality spend on daily sewerage per inhabitant? This is expressly separate from sewerage charges, as these are structured differently in each municipality and therefore difficult to compare.
(4) *Organisational capacity:* to what degree can the municipality actually realise what it has planned in its sewer schemes and how efficiently is that carried out?
(5) *Nuisance/complaints:* how many complaints about the sewerage does the municipality receive and how does it handle them?

Each perspective is presented with one or more *critical performance indicators* (CPI). In their turn the CPI are constructed from a weighted sum of underlying indicators. In the pilot these indicators have been the subject of discussion with the participants. Is each indicator clearly defined, easy to obtain and relevant for its according perspective? Table 1 gives an overview of the perspectives, critical performance indicators and the underlying indicators.

The critical performance indicators within the five perspectives of the balanced scorecard are presented in a flower-like figure as shown. This picture ranks each participant in a relative way on the most important performance indicators. In this manner performances with potential for great improvement are easy to detect (see Figure 2).

To be able to compare the municipalities, each aspect has been given one or more CPI. These generate a score, which clearly shows how municipalities "perform" in the relevant aspect in relation to each other. Based on these differences, it becomes clear where the municipal sewerage management can be improved.
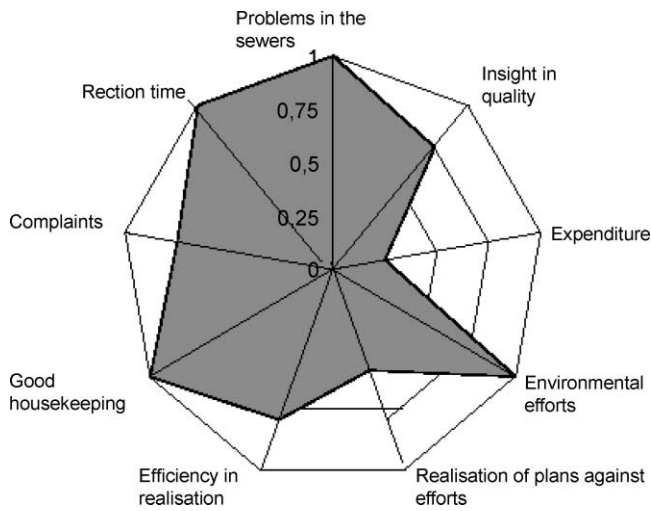
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[1] Only the costs of cleaning and inspection appeared sufficiently registered to be comparable.

Figure 2 Relative ranking on critical performance indicators

The indicators are scored relatively. All participants are divided into quartiles on each indicator. The participant in the top 25% ranks a 1 and in the lowest 25% scores 0.25.

Results

The added value of the exchanges between municipalities became clear at the second meeting in the pilot. The conclusion was that no municipality is the "best performer". Neither were the participants presented with clear-cut answers. Instead, they had to interpret the results themselves, searching for the how and why. For example, why does municipality A inspect the sewers in a different way and with a different frequency than municipality B, and what are the results? The following results were obtained for each individual aspect.

Condition and functioning: insight into the functioning and quality of the sewers is important as a foundation for planning. It is striking that some participants base their planning on a relatively limited view of the condition, while others take a broad view. There is no standard within the sector with regard to what the insight into the condition should be. Discussion of this aspect is therefore needed. Many municipalities need to take structural measures over the next few years to improve functioning (Figure 3).

Expenditure: the expenditure for daily sewerage management differs greatly. This is probably due to great differences in approach. To enable better comparison of the performances in this area it is important to agree as a sector as to what exactly counts as
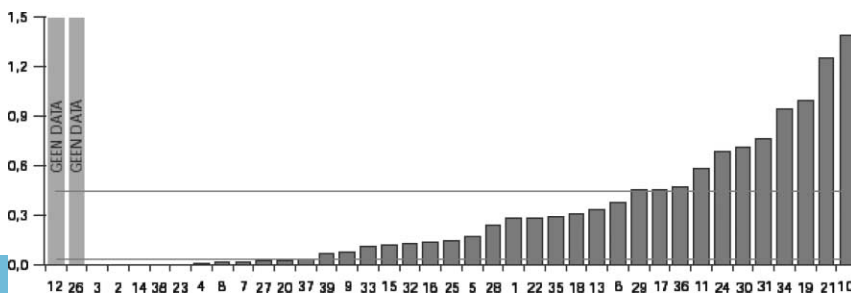

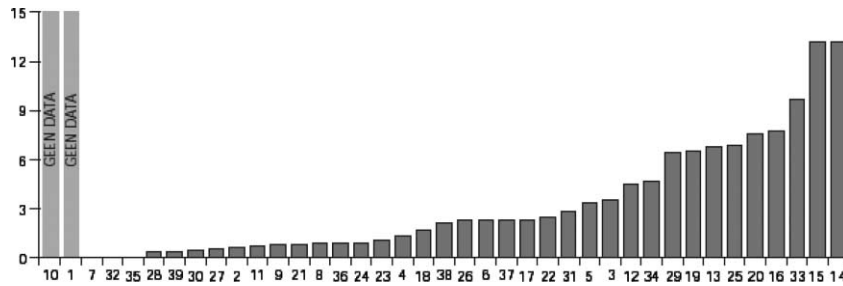
Figure 3 Insight in condition and functioning

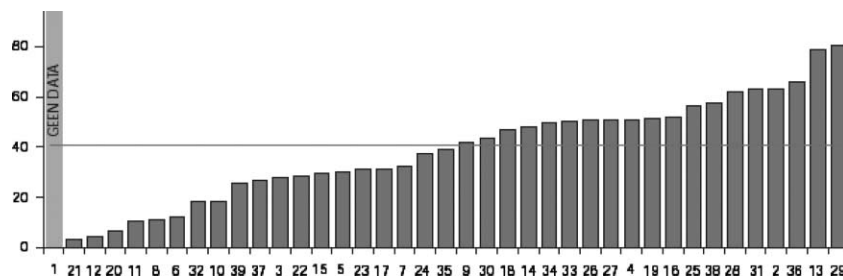**Figure 4** Expenditure for cleaning and inspection

Figure 5 Organisational capacity

"sewerage expenditure" and regarding the method of registration. Comparison with others can reveal the degree to which municipalities with higher annual costs score differently in other areas (Figure 4).

Environmental efforts: municipalities have to limit the pollution emission from the sewers by 2005. They are also no longer permitted to have any non-decontaminated discharge within their borders. The participating municipalities have realised both obligations for an average of 65%. The urbanised municipalities achieve 50% and the rural municipalities 75%. A concerted effort will be needed in the next few years.

Organisational capacity: to what degree does a municipality realise its sewerage plans within the term and budget it has planned? How do they keep an orderly sewerage? The general conclusion is that the organisational capacity – particularly the planning – is a major point for improvement in the sewerage sector. Municipalities have difficulty keeping their sewerage management "in order". This can be due to the fact that they have much to do these days (dealing with the countryside, CSO emission reduction, replacement of systems). If it remains so in the next few years, then sewerage management will deteriorate. Personnel deployment is expected to play a large part here. It can be deduced from the benchmark, however, that the prompt realisation of plans does not depend solely on personnel deployment. On average, the municipalities realise four of five projects within the planned term and budget (Figure 5).

Nuisance/complaints: this is one of the areas in which the standardisation of data is needed. As the differences between the municipalities are great, it is not yet possible to arrive at hard and fast conclusions. We can conclude, however, that the number of complaints in relation to response time will play an increasingly major role, as the views of the inhabitants constitute an important aspect, certainly for politicians.

Discussion

Learning points emerging from the methodology

The methodology in the pilot generated the following "learning points":

(1) Benchmarking leads to improvement of the sewerage management and is a logical step towards further professionalisation. The collection of data and participation in the benchmarking process alone can lead to improvements in the working processes. Benchmarking is primarily a learning process. Accountability and transparency are made subservient to improvement.

(2) It is essential for data within the sewerage sector to be both available and comparable. The more available they are, the better they can be compared. The same applies to an unambiguous definition of the accepted terms.

(3) The comparison must be properly explained to prevent it being interpreted in terms of "good" and "bad" performance. Only after such explanation can the actual improvement process start.

(4) According to the results of an enquiry among the participants, the overall opinion on the quality of data acquisition is satisfactory.

The influence of local circumstances

A total of six characteristics of the participating municipalities were considered:

- Municipality size
- Degree of urbanisation
- Urban growth speed
- Soil type
- Environmental vulnerability of the area
- Type of sewerage system

The influence of these characteristics was statistically analysed for each aspect. What emerged was that the degree of urbanisation, in particular, plays a role. The other aspects have less influence. Differences in performances, therefore, are to be found by municipalities adopting another approach or other methodologies and not directly on the local circumstances.

Future perspective

Since the third meeting of the participants several follow-up actions have taken place. In small groups people discussed the encountered differences to derive best practices and ways to implement them. One group focuses on inspection techniques and frequencies. One group focuses on administrative tools to improve registration of complaints and nuisances. A third group discusses the standardisation of data.

In the government's annual planning, the ministry of Spatial Planning, Housing and Environment has declared the benchmarking methodology as the best way for improvement and transparency in sewerage management. It is stressed that the bottom-up approach will lead to the best results, but legislation is possible in order to stimulate the participation of all municipalities.

Currently, the RIONED foundation has invited tenders for benchmarking the next six groups of approximately 30 municipalities. With a declining number of municipalities it is expected that in the next five years most managers will learn more than cost-effectiveness from benchmarking and hopefully will be able actually to implement the improvements to be found.

Citizens, companies and sewerage managers can all profit from benchmarking. However, most of all benchmarking can be a tool bringing sustainable urban water management effectively closer to reality.

Conclusions

(1) The pilot has shown that it is possible to obtain direction for improvement by benchmarking municipalities on the management of sewer systems.

(2) Five perspectives on a balanced score-card give sufficient insight into the relative position of a participant but are especially a list of signals where improvements can be made.

(3) Benchmarking public organisations needs the right balance between accountability and improvement. In the Netherlands accountability is made subservient to improvement.

(4) The results show large differences and should not be interpreted in an absolute way but as possible signals for further invenstigation.

(5) The improvements are best detected within small groups exchanging their experiences and knowledge after the benchmarking results are correctly interpreted.

(6) The sector lacks quality standards.

(7) Confidence in quality of data and sound arguments for encountered differences both stimulate willingness to account publicly.

(8) Local circumstances have little influence on the results, other than the degree of urbanisation. Improvements can be found mostly in the way working processes are conducted.

References

Stichting RIONED, (2003). Het riool vergeleken. Technical report in Dutch. (www.riool.net).

Tillema, S. and Van Helden, G.J. (2003). Use of Multidimensional Benchmarking Information by Public Sector Organisations. RijksUniversiteit Groningen.