The value of data and information for implementing water demand management and the role of the envisaged Rand Water bureau to obtain same

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Abstract Successful water demand management requires accurate and timely data about the operation of the system. Various engineering management information systems have been tried in municipalities to capture such data but were prone to become inoperable through neglect. In reaction to this, Rand Water devised a bureau-based service for obtaining water demand management information, with significant benefits to the municipal councils and to the utility.

Keywords Demand management; information; water

Introduction

Rand Water supplies potable water to 10 million people in the Gauteng Province in South Africa. While doing so, Rand Water also assists its customers, the municipalities and metropolitan municipalities, with the implementation of a wide variety of Water Demand Management interventions. To enable Water Demand Management to be implemented, information is needed. This information, while available as data in the meter books of municipalities after meters have been read at the end of each month, cannot be utilized. The reason for this is that the administrative effort of trying to access consumption figures is prohibitive.

A variety of management information systems (software) that could assist in this task is available on the market in South Africa. The authors have, over a period of 10 years, done extensive investigations into these systems and have started working together with a service provider, WMS cc, to deliver such a service.

Engineering management information system

Water utilities across the world are increasingly forced by Government intervention or economic realities to move towards an improved "customer service" policy. This has gained considerable momentum over the last few years, even more so in Southern Africa. Water utilities are faced with the daunting challenge of substantiating investment in terms of improved "customer service" and of also demonstrating a "value for money" service. Nowadays water utilities are faced with the reality that all strategies must be "customer focused" and one of the key functions in this regard is to focus on service delivery, to demonstrate a *value for money* service and also *"To provide a level of service at a rate that is acceptable and affordable to the customer"*.

Bureau service

Rand Water has, over a number of years, seen municipalities acquire such information systems but these are then neglected to the extent that they become inoperable. The reasons for this are manifold:

- the system champion leaves
- the software and hardware are not upgraded
- personnel running the system go on leave
- little maintenance.

Rand Water is now in the process of offering such a service to municipalities. The reasons for introducing a Bureau are:

- centralized information
- expertise available and kept
- economy of scale
- maintenance ease
- municipal managers can manage as information needs are cared for
- strategic value for Rand Water – information on water consumption and where it happens would be available.

The cost implications are a monthly charge per consumer per month which will include the support of software, hardware, salaries, and system support.

The advantage to a Council will be that the *Bureau* will be responsible for the smooth running of the system, and will also provide monthly management reports for control purposes. These reports will be provided on a continual basis and will show the key performance indicators. The performance indicators will provide management with sufficient information to assess whether expected performance has been achieved.

Different services of the bureau

Water meter management. The Bureau will log all water meters, incorporating an electronic meter card, meter test results, meter replacement policy programme, meter selection, size, in-service life of meters, and pre-paid meters and costing for each activity. Meter maintenance is based on the following: *"Water meters will deteriorate and fail at a rate that is predictable under normal constant conditions of usage".*

The Engineering Infrastructure Management System (EIMS) is a management system that includes the following:

(a) The optimal frequency (in-service life) period for the replacement of water meters is required to minimize the loss of revenue to the municipality due to meter slip (under registration).

(b) The selection of meters for a particular duty and conditions will have the ability to register all the water that passes through at the desired accuracy. This will result in the amount of revenue loss to the Municipality being minimized.

Customer service/service requests. The Bureau provides the municipality with a management system paying particular attention to the registration of specific complaints and service requests and indicates when the work was logged, when the work was completed and also the response time for each activity. It also provides the historical information to determine the frequency of events. The system uses a "closed loop – start-to-finish" application ensuring that no activity can be "lost" (not attended to) before the actual work has been done. This system can be used as a customer service centre to log all services requests e.g. sewer, roads, electricity, parks, etc.

Pipe breaks/leaks. The Bureau provides the municipality with a management system which will record each activity together with the following:

- location of break/leak
- date and time
- diameter of pipe
- type of pipe material
- type of repair
- cost of repair
- breaks that can be shown on a GIS.

This will provide the management information to determine a method of repair or determine a replacement policy.

Pipe isolation/valve database. The Bureau provides the municipality with a management system that provides a database, which in turn provides for the systematic shut-down of pipe segments. A pipe segment is that section of pipe that is located between specific valves and has its own ID. If the pipe or stand is selected the database will indicate which valves must be closed and the location. The owners of the stands affected by the shut down will also be shown, and these can be notified of the shut down. The pipe ID is also used for recording the step testing information.

Hydraulic pressure contours/hydrant database. The Bureau provides the municipality with a management system that provides a database to record the pressures, flows, and date and time stamping of the event. This information is used to audit and monitor the hydraulic model. It is also used to monitor isolation valves, closed valves, and broken valves. The database information is also used to create a pressure contour of the whole supply area.

Contract/fully integrated. The Bureau system includes a fully integrated as-and-when "Contract" which covers all aspects of the maintenance work required for a water reticulation. It also includes the allocation of jobs and payment certificates. The bureau will provide the administration and the municipality will be responsible for the allocation of work and the supervision of the work.

Work scheduling. The Engineering Infrastructure Management System (EIMS) makes provision for the automatic scheduling of work activities.

Mechanical maintenance services. The Engineering Infrastructure Management System (EIMS) provides the municipality with a computerized management system to maintain the mechanical equipment such as pumps, pressure control valves, reservoir inlet control valves, compressors, large electrical valves, vehicles, etc. The impact of mechanical maintenance within a water utility is always underestimated.

Asset register. The Engineering Infrastructure Management System (EIMS) includes an asset register for all fixed equipment, moveable equipment, tools and loose gear and includes the following:

- purchase costs/valuation of asset
- location
- straight line depreciation method
- anticipated in-service life
- maintenance costs to date
- person responsible for the goods.

Fire services. The Engineering Infrastructure Management System (EIMS) makes provision for an electronic Fire Service Card which will be maintained by the Utility on the data base. Fire installation can be divided into various categories as each one can and will have a different influence on the service charges. This service to be sealed by the Utility will also be identified. The "Fire Services" various groups, each with their unique requirements, are shown below:

1. Fire Services not metered – internal service sealed by the Utility
2. Fire Service only metered (no domestic)
3. Fire Service and Domestic Service metered
4. Electronic fire service card.

GIS interface

The Bureau provides the link of the data to the GIS to show:

1. Pipe breakages:
   - frequency
   - location
2. Meters:
   - stopped meters
   - non-reads
   - no consumption
   - leak at meter
   - meter box broken
3. Outstanding complaints
4. Water zones

Sub-Store. The system provides for a Sub-Store which is requisition driven. This provides "maximum and minimum" stock levels with a complete audit trail from the stock issued from the store to the field personnel and the actual use of material on each site. The material used on site will be indicated on a "material list" which is attached to the job card. The programme will determine the optimal levels of stocks to be held in the store, and this will be dependent on actual usage. The system will measure the indirect cost due to not having material available.

Wider view of costing. The Bureau is concerned with the wider use of costing information for planning, control, and decision making purposes. It must be emphasized, however, that the existence of a sound, well organized basic costing system is fundamental to whatever use is made of the information, whether for routine cost ascertainment purposes or for a one-off management decision.

The system is job-card driven providing a detailed cost of each activity. The costing is divided into 3 elements as set out below:

- labour
- material
- transport and equipment.

Time keeping. The Bureau provides a leave register. The leave register is used to check that the person required to submit job cards for the day is not on leave. If the system indicates that he is on duty and no job card has been returned a query report will be generated.

Accounting. The system provides for the redistribution of funds to the various cost centers and passes the information to the Treasury Department.

Conclusions

At the end of each month, when water meters are read by the city Treasurer, and as the EMIS data base is seamlessly linked with the billing data base, the readings enters the EMIS data base. Each water meter is uniquely identified in the data base and as such, a history of readings for each consumer connected to the water supply system is kept.

The EMIS is then set up in such a way that it will automatically calculate the real consumption of districts and zones in the network and at the same time compare such consumption to the district and zone meters. A monthly automatic water balance and audit is thus being done.

For Rand Water, the value will be in getting the readings of the district and zone meters, giving a water balance with its own water meters and also supplying almost real time planning information. The system will also be invaluable in helping to cope with the frequent droughts that occur in South Africa.