

# **RESEARCH ON THE MUNICIPAL RESPONSIBILITY TO SUSTAINABLY MANAGE SERVICES INFRASTRUCTURE ASSETS**

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## **ABSTRACT**

The competing demands that are made on limited municipal operational budgets (and staff and other resources) severely constrain the proper management of services infrastructure.

Some research work has already been done in the area of public sector infrastructure asset management in South Africa, and there have been numerous initiatives aimed at addressing specific aspects, or the needs of specific owners of infrastructure assets. But it would appear that a lot more is needed, if infrastructure management is to be adequate, in terms of inter alia: the legislative framework, convincing those responsible for budgetary allocation, skills training, the buy-in by national government and other big spenders on or funders of public infrastructure, alternative delivery models and delivery agents for infrastructure management, and of norms/standards/levels of service and KPIs.

These need to be identified and then tied together in some way, to be determined, in an enabling framework.

## **1 BACKGROUND**

Since the 1994 elections, municipalities have been focusing on the delivery of basic services, i.e. roads, drainage, water, sanitation, electricity and health services. The Development Bank of Southern Africa (DBSA), the Department of Water Affairs and Forestry (DWAF), the Department of Provincial and Local Government (DPLG), and the Infrastructure Finance Corporation (INCA) alone between 1994 and 2004 funded at least R37 billion investment in engineering infrastructure new works, upgrading and rehabilitation, the bulk of it to water services. In addition, a significant proportion of the R29,5 billion spent by Department of Housing has gone to engineering infrastructure.

Thus an immense amount of money has been invested in engineering services infrastructure that has become or soon will become the responsibility of municipalities to operate and maintain.

Furthermore, a significant proportion of the South African population does not enjoy basic services (for example safe water and/or acceptable sanitation), and it is the stated intention of national government to fund the rolling out of the engineering services infrastructure to

address this. This represents a huge responsibility for the construction of new infrastructure and, after its construction, its operation and maintenance.

The replacement cost of services infrastructure constructed prior to 1994 and still in service (or that ought to be in service, but needs repair or rehabilitation) is thought to be of an even larger order of magnitude than the replacement cost of that constructed since 1994.

There is strong evidence however that insufficient attention has been paid by the majority of municipalities to the on-going commitments that they have incurred to operate and maintain their infrastructure. The effect will be that this infrastructure will deteriorate well before the end of its designed life. Depending on the infrastructure concerned, it could be that the riding quality of roads deteriorates and wear and tear on vehicles increases, water pressures drop, water supplies are interrupted, treated water that has been purchased by the municipality leaks from pipes and fittings, watercourses are polluted – and other similar results will ensue. In due course, the communities will be completely deprived of the services. If the budgets at that time permit, infrastructure will have to be rebuilt, at much higher cost than if the original infrastructure had only been properly operated and maintained since it had been constructed. And, until the infrastructure is rebuilt and back in service, there will be the cost to the community and the local economy of being deprived of the services – and/or in some instances in having to make expensive alternative arrangements.

Legislation requires municipalities to provide operational strategies that *"align the municipality's resources for the realisation of its development objectives..."* (Local Government: Municipal Systems Act, 1998) and must include a medium term financial plan setting out *"how the capital and operational expenditure ... is matched by its revenue raising strategy."*

If due regard is to be paid, in a manner that conforms with the requirements of the Municipal Systems Act, to the sustainability of the infrastructure created by development plans, municipalities should simultaneously plan and provide for the long term management of all their infrastructure assets.

"Delivery" of services does not end with the commissioning of the infrastructure. Once the infrastructure has been commissioned, the activities necessary to ensure that it continues to perform are very often not carried out – such as the necessary staff are not appointed or the necessary budgets are not approved.

In this context, the CSIR has identified that there is a need for a structured approach to and methodology of infrastructure management ("management" in this sense includes operations and maintenance) that addresses the needs of South African municipalities.

## **2 THE STATE OF SERVICEABILITY OF INFRASTRUCTURE IN SOUTH AFRICA**

Overviews of the state of serviceability of infrastructure nationwide are invariably based on (sometimes limited) sample surveys. Even many individual municipalities and utilities are hard pressed to describe serviceability of the infrastructure for which they are responsible. They are able to describe sectors of their responsibility (many municipalities can tell you about their roads serviceability, because they have a "pavement management system"), but they are not able to describe the entire range of their responsibility. There are of course outstanding

exceptions -- there is no shortage of South African good practice examples against which owners of infrastructure could benchmark themselves if they wished.

Nonetheless there is a growing recognition that measuring the state of serviceability is an essential precursor to the correct targeting of infrastructure management. For example, at least two provinces have processes under way to measure, on the basis of fairly extensive samples, the state of serviceability of municipal roads infrastructure in their provinces.

### **3 THE STATE OF SERVICES INFRASTRUCTURE MANAGEMENT IN SOUTH AFRICA**

Recent surveys and investigations have found strong evidence that insufficient attention is being paid by the majority of municipalities to the ongoing commitments that they have incurred to operate and maintain the services that they have the responsibility to deliver. In addition, many authorities have, due to years of neglect, built up a backlog of maintenance needs. The competing demands that are made on limited operational budgets (and on staff and other resources) severely constrain the proper management of existing and new infrastructure and facilities assets

#### **3.1 The 2002 IMESA survey**

In 2002, the Institution of Municipal Engineering of Southern Africa (IMESA), assisted by the CSIR and others, undertook a survey of infrastructure management in seven of the larger authorities (five municipalities and two water utilities), in order to determine their appreciation and application of infrastructure management. The pertinent findings of the survey can be summarised as follows:

- In respect of many of the aspects of infrastructure management surveyed (such as knowledge of assets, asset utilisation and asset operation and maintenance), the South African authorities compare well with the chosen benchmark (New Zealand authorities).
- However in respect of other aspects (in particular asset accounting, and making financial provision for improvement of infrastructure), the South African authorities compare very unfavourably with the benchmark.

It is highly relevant to note that in New Zealand these kinds of provisions are required by national legislation.

However a less in-depth questionnaire survey by the IMESA team of a much wider sample of municipalities (and thus capturing generally less-resourced municipalities than did the first survey) indicated a far lower level of infrastructure management capability. Furthermore, although a high percentage indicated that they prepared the Integrated Development Plans (IDPs) and Water Services Development Plans (WSDPs) required by national government, anecdotal evidence and the general level of capability identified by the questionnaire survey suggested that these plans were not supported by sound analysis of infrastructure needs or definition of service levels.

#### **3.2 The 2003/2004 CSIR survey**

Building on the IMESA survey, the CSIR investigated selected municipalities in more depth, drawing in part on several reports and studies commissioned by various authorities to

investigate the state of municipal infrastructure assets and their management. The pertinent findings can be summarised as follows:

- A few municipalities have world-class practice in respect of many of the aspects of infrastructure management (such as knowledge of assets, demand analysis, asset creation and disposal, asset utilisation and operation and maintenance), although they might not be at as high a level in respect of other aspects such as strategic planning, asset accounting, and planning for and making financial provision for renewal and upgrading of infrastructure.
- On the other hand, many municipalities do not even have the basics in place, and gross shortfalls in management policies and practice exist in many municipalities.
- The entire range of capacity and competence can be found in municipalities between these two extremes.

Much encouraging practice was found. For example:

- Good rapport between councillors and officials in respect of infrastructure management.
- Asset registers that held information really useful to infrastructure asset management.
- The making of improved financial provision for renewal of infrastructure. And, although budgets remained inadequate, instances were found (for example) of understanding that appropriate expenditure on infrastructure management can, by reducing water losses, save other expenditure many times over, and can also reduce the risk of system failure.
- The attempt being made before purchasing infrastructure to project the operations and maintenance requirements into the foreseeable future -- and in some instances changing new works infrastructure plans in the light of these projections.
- Understanding that it is necessary to improve infrastructure management across all parts of a system -- for example that it is no good just looking after assets in the form of physical infrastructure, if equivalent attention is not paid to personnel (the "intellectual assets"), for example by career path planning and succession planning.

On the other hand, some current practices were discovered that can only be described as blindness to the long term view, with actions dictated by short-term gain. (An example is one large municipality's decision to extend free basic services, to "go easy" on a property rates increase, and to halt retrenchment, while at the same time cutting budgets for infrastructure refurbishment and renewal. This cannot only be ascribed to decision-makers focusing on the then forthcoming (April 2004) elections -- there were also for example disheartening signs of politicians' at times intense mistrust of officials.)

In between were examples of municipalities for the first time realising that it is all very well to enjoy good infrastructure management practice in individual sectors of their organisations, but that a comprehensive infrastructure management approach, with adequate budgets, is now necessary. In part this change of heart is dictated by the improving statutory and regulatory environment towards infrastructure management. In part also it is in response to pressure from their constituencies (such as consumers expressing dissatisfaction with service, and especially dissatisfaction with perceived or real declining reliability of service). However, encouragingly, this change of heart is also due to greater understanding, not confined to engineers, of all of the following and more:

- How great the backlog in maintenance and refurbishment has become, and how close key facilities are to failure.

- How demand has grown faster than has the provision of new infrastructure (especially bulk infrastructure), and thus how little spare capacity there now is in some key facilities. And how this manifests itself -- for example in that it may have become impossible to close some infrastructure elements down for their routine maintenance because, if they were to be closed down even for the period of maintenance, acceptable limits of customer service would be breached.
- How targeted investment in specific facilities or areas can significantly reduce risk and/or can produce spectacular financial rates of return.

It is becoming more and more apparent that the loss of intellectual assets is a very major threat to effective infrastructure management in many municipalities. The loss of key technical staff, and their non-replacement, or replacement by others less qualified, is inhibiting infrastructure management and in many cases can be identified as the main reason for breakdown of an element of a service. Specific issues identified are:

- High turnover of staff.
- The loss of skills and of institutional memory consequent upon the departure of experienced staff.
- Little or no career path planning and succession planning.
- The loss of mentors consequent upon the departure of experienced staff.
- The loss not just of the most highly trained staff, but of the middle order – in particular of those who had originally qualified as artisans, and who had worked their way up through the ranks to supervisor positions.
- The appointment of non-technical personnel to management positions requiring technical experience.

In addition, the quantum and geographical extent of infrastructure that many technical departments are responsible for has greatly increased, sometimes by orders of magnitude, but without concomitant increase in the technical staff establishment.

Behind the threats to infrastructure management is often grossly insufficient understanding by local authority politicians of the importance of operations and maintenance. This insufficient understanding is crucially manifested in the under-resourcing of the operations and maintenance budget -- sometimes exacerbated during the course of a financial year by reallocation of some of this budget to other purposes.

#### **4 THE NEED FOR AN ENVIRONMENT MORE ENABLING OF INFRASTRUCTURE MANAGEMENT**

Some research work has already been done in the area of public sector infrastructure asset management in South Africa, and there have been a number of initiatives aimed at addressing specific aspects, or the needs of specific owners of infrastructure assets. Consultants offer a variety of skills and services including infrastructure management manuals and (IT and other) systems.

CSIR Boutek identified that, whereas these manuals and systems are very useful to the better-resourced municipalities, they are much less useful to the great majority of municipalities. Also, it would appear that a great deal more than manuals and systems is needed, if infrastructure management is to be adequate -- inter alia: a suitable legislative

framework; convincing those responsible for budgetary allocation (without the political will to allocate adequate budgets, the beneficial impact of any consultants' services or of manuals or systems will be limited); skills training, skills retention, and mentorship; the buy-in by national government and other big spenders on or funders of public infrastructure; alternative delivery models and delivery agents for infrastructure management; and the determination of norms, standards, levels of service, and key performance indicators.

The above need to be identified, and then tied together in some way yet to be determined, in a more proactive and enabling framework. This framework would:

- Outline how infrastructure management must be incorporated into: agendas of programmes and plans such as the WSDPs; the culture of organizations such as the South African Local Government Association (SALGA); the lending practices of major funders; and the budgeting practices of all municipalities, and national and provincial departments with major infrastructure assets.
- Outline the legislation, IT systems, budgets, incentives and guidelines and norms etc necessary to ensure that this incorporation takes place.

A report motivating and setting out in some detail the rationale for, the environment of, and steps towards identifying the components of such a framework, could serve several purposes. Not the least important of these purposes is that the report could be used as a vehicle for advocacy to those who have the greatest power at national level to improve municipal infrastructure management in South Africa. These could include, but might not be limited to, the National Treasury, DPLG, and SALGA. Of course, it is hoped that this report would also inform and influence municipalities directly.

## **5 THE CSIR INVESTIGATION**

Accordingly, in 2003 CSIR Boutek commenced a two-year investigation of the gap between much of current South African municipal infrastructure management practice and the current environment of infrastructure management, on the one hand, and acceptable practices and a more enabling environment on the other hand. The investigation also has the objective of describing this more enabling environment.

CSIR has thus far completed the following:

- Formulated an infrastructure management framework as a theoretical construct.
- Undertaken a first level study (that is, trying to gain an overall rather than detailed impression - relying on available information rather than commencing new investigations), of the following with respect to the South African municipal sector -
  - the status of infrastructure, with respect to its current serviceability, and with respect to management budgets and other resources that are programmed;
  - current infrastructure management norms and practices;
  - some other issues that may lie behind serviceability, such as intellectual assets, levels of service, usage/loading, and maintenance practice;
  - capital programmes at national level responsible for infrastructure delivery (e.g. by DWAF), their quantum and characteristics, and the provision they make (or do not make) for on-going operation and maintenance of the infrastructure that is delivered;
  - legislation (including WSDPs, the Generally Accepted Municipal Accounting Policies (GAMAP) and the Municipal Financial Management Act (MFMA) of 2004);

- infrastructure management manuals and IT systems available commercially, and their use and usefulness; and
- the norms, standards, levels of service and key performance indicators for performance-based sustainable infrastructure services – what they should or could be.
- Undertaken a study of equivalent issues, but outside of the South African public service sector.

## 6 THE FINDINGS THUS FAR

Selected findings are:

- Whereas there is much guidance available on how to do life-cycle planning, and how to use life-cycle plans of technological alternatives in order to decide between them prior to commencement of initial capital works, there is a dearth in the literature of public sector worked examples. It is at least possible that the reason for this is that in practice life-cycle planning is not made that much use of, or it lacks credibility. In turn it is at least possible that the reason for this is recognition of the great uncertainty surrounding assumptions of the operations and maintenance regime into the future -- and should these assumptions prove incorrect, this would negate much of the care put into the life-cycle planning.
- South African legislation (such as the MFMA and statutes and regulations relating to WSDPs), where it relates to infrastructure management, sets very broad parameters. As a result, whereas legislation creates a conducive climate, it does not compel a municipality to perform adequate infrastructure management.
  - GAMAP, for example, requires municipalities to depreciate assets, but does not prescribe that a depreciation model must be used that will determine adequately the funding to be put aside each year to meet future liabilities for infrastructure renewal. Nor does it prescribe that the money actually be put aside. It is clear however that there is no sensible alternative to South African municipalities being required to put this funding aside, as is required in terms of New Zealand legislation.
  - GAMAP also requires that an asset register be drawn up, but does not specify that the register should record the capacity, condition, importance and risk, and other factors essential to the register being of use to infrastructure management.
- South African legislation is less than satisfactory on defining "value". In particular, in terms of GAMAP, valuation is determined on the basis of historical cost adjusted by depreciation and expenditure on refurbishment. Which is not of much assistance to financial planning for infrastructure management.
- A section of the CSIR investigation reviews the history of infrastructure in each of a small sample of areas over a couple of decades -- paying attention to (inter alia) construction practice and choice of materials, usage/loading and maintenance practice, and skills and management quality in the area. Of particular interest are those areas formerly administered by the apartheid-era "Black Local Authority" systems, with their chronic parlous financial status at the time. Clearly, their political legacy was the dominant factor determining their past infrastructure management regime.
- A review of a sample of infrastructure management IT systems available commercially in South Africa reveals that:
  - a certain level of capacity is needed within a municipality to justify even an entry-level IT infrastructure management package;
  - a number of IT systems are commercially available in South Africa -- all of them working on the basis of integrating a number of functionally specialised software packages (for

sectors such as roads and water supply), functioning through a set of related integrated management systems and linkages with conventional database and GIS software systems, to provide an infrastructure management system tailor-made to the client's requirements. Usually the database and GIS facilities are shared with other applications to serve the various other needs of the client; and

- a municipality that purchases an IT package needs to commit substantial in-house resources to collecting and verifying data.
- Finally, a section of the investigation reviews infrastructure management by a selection of parastatals and private sector infrastructure owners in South Africa. Much good practice that is useful as a source of information or comparison for municipal policy and practice is discovered. For example in terms of keeping adequate asset registers; doing life-cycle projections of alternative equipment or processes and using these projections to decide between the alternatives; and linking part of the bonus system of all staff to a single performance measure, to the achievement of which all can contribute and that has a direct relationship to the service's availability and reliability.

## **7 CONCLUSION**

The investigation by the CSIR has found many instances of gross shortfalls in municipal infrastructure assets management policies and practice. The sustained provision of services from a significant proportion of the municipal infrastructure is under threat.

During the financial year 2004/2005, the CSIR focussed on:

- expanding the body of case study research into both good and bad practice -- with a view to in due course systematising the experience gained, and disseminating the results; and
- identifying the authorities at national level that are in the most powerful position to influence policy and practice improvement at the level of municipal government, discussing what each could do, and strongly advocating to each of them that they take appropriate action.

It is early days yet, but initial responses by key officials to the CSIR's advocacy are very encouraging. It is clear that these officials have themselves become aware of the shortcomings of current management, and the work by the CSIR on what needs to be done is being welcomed.

The CSIR research report is due for completion later in 2005.