

MANAGING INFRASTRUCTURE AND UNDERPINNING THE PLANNED ENVIRONMENT

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Abstract

Planning the built environment is, or should be, also about providing and managing (i.e. operating and maintaining) this environment, *viz.* the engineering infrastructure (much of which is underground), structures and public amenities. However, never mind how well these are planned and constructed, they are often not well managed.

The paper briefly summarises the main research into the state of the built environment in South Africa and what is needed for that built environment to be sustainably managed, and it describes the most important of the national initiatives to address the management of our infrastructure.

Key words

Infrastructure, assets, operation, maintenance, management, sustainability

Introduction

Planners generally take for granted that the environments they plan will be sustainably managed. However, these environments, notwithstanding how well they may have been planned, are often not well managed. Manifestations thereof range from power outages and overflowing sewers, to potholed roads, faulty traffic lights and run-down buildings.

Yet planning is, or should be, also about providing and managing (i.e. operating and maintaining) the built environment, *viz.* the engineering infrastructure (much of which is underground), structures and public amenities. Nonetheless, competing demands on resources constrain sustainable management of this environment.

Infrastructure in the form of public buildings, roads, water and sewerage, electricity and other infrastructure services, supports quality of life and is the foundation of a healthy economy. The 'Blueprint for a new South African economy' (the *Accelerated and Shared Growth Initiative* (ASGISA)) places infrastructure management high on the developmental agenda as a key to economic growth and sustainable development.

The topic has received significant attention during the last two years or so. National initiatives include Cabinet's adoption of a National Infrastructure Maintenance Strategy, sector strategies by government departments (in particular the Department of Provincial and Local Government (DPLG) and the Department of Water Affairs and Forestry (DWAF), the Government Immovable Assets Management Act (GIAMA), and the first national 'report card' of the state of infrastructure.

These initiatives recognise that infrastructure investment and management underpin the sustainability – indeed the habitability – of the planned environment. Poor infrastructure management threatens planning goals – for example, inadequate water supply and malfunctioning sanitation threaten health; unreliable electricity leaves homes and businesses in darkness; unmaintained school buildings hamper education.

If the appropriate infrastructure services have been provided, and these services are effectively managed, they promote economic growth and health, promote equity, alleviate poverty and support sustainable development. Individuals benefit from the provision of water and sanitation, transport, shelter, energy and telecommunications infrastructure. They are less prone to sickness and enjoy better access to facilities, to work opportunities and to markets. Income-earning opportunities arise also in service delivery and in construction projects and in the maintenance of infrastructure. From an economic development point of view, infrastructure lowers the cost of production and consumption, and makes it easier for participants in the economy to enter into transactions.

Operation and maintenance practices in South Africa have sometimes fallen far short of desirable standards. In extreme cases, in some municipalities, as much as one-third of the engineering infrastructure constructed during the last 20 years is no longer usable.

This paper describes progress with the above-mentioned initiatives, and also the main research into the state of the built environment in South Africa and what is needed for that built environment to be sustainably managed.

The author is centrally involved in much of this work.

State of the built environment

The most comprehensive review to date of the state of the built environment in South Africa has been that released by the South African Institution of Civil Engineering (SAICE). At the end of 2006 SAICE released the first ever 'report card' of the state of infrastructure (SAICE, 2006). This report highlighted "the observations of the professionals responsible for the planning, construction, operation and maintenance of our nation's life-support system". It graded South Africa's infrastructure (water, sanitation, solid waste, roads, airports, ports, rail, electricity and hospitals and clinics) on a scale from A+ through E-. Overall, it gave the infrastructure a D+ grade.

The 2006 report card captured information from the main studies available at the time, including the work done by DWAF preparatory to the water services infrastructure asset management strategy formulation (described below).

As the title of the report card implies, it focused on engineering infrastructure, but it did cover other aspects of the built environment also – particularly hospitals and clinics. Housing and schools were

important omissions, but SAICE plans to cover these in report cards of the future. SAICE also hopes in report cards of the future to begin to discern trends in the state of the built environment.

To the author's knowledge, no national overview of the state of housing has been conducted in recent years (if ever).

In September 2007 the (national) Department of Education released the first report of the *National Education Infrastructure Management System*. This report showed substantial progress since 1994 in addressing the need for school accommodation. Unfortunately, as is the case with other built environment sectors, management of the facilities has not kept up with the pace of new construction.

"Regrettably, in some cases, once good facilities have been degraded due to vandalism, neglect and inadequate maintenance. 14% were found to be in a poor condition, and 12% very poor. In the Eastern Cape 40% of schools are assessed as being in a poor condition. Some of the most concerning backlogs relate to the provision of water and sanitation to schools." (Department of Education, 2007)

Problem statement – the challenges

Clearly, this is a less than desirable situation. Government has in recent years become increasingly aware of the challenges, and moves have started to address them.

All three spheres of government, together with the state owned enterprises (SOEs), manage major portfolios of immovable assets. (For the purposes of this paper, 'public sector' includes SOEs such as Eskom, Transnet and Telkom.) The CSIR in 2006 estimated that the then current replacement cost of the infrastructure owned by the public sector excluding the SOEs exceeded R1 000 billion – water services infrastructure alone could only be replaced at a cost of between R160 and 200 billion – a considerable investment.

While there is much emphasis on 'delivery', delivery does not in fact end with the creation and commissioning of the built environment asset. Once the asset has been commissioned, various activities must be carried out which are necessary to ensure that it continues to perform – such as the allocation of necessary budgets and the retention of appropriate staff to maintain the operation of the assets. 'Delivery' needs to be universally understood as embracing not just constructing the infrastructure, but the appropriate operation and maintenance thereafter, for the whole design life of the asset.

In this paper, 'management' is used as a generic term to include operation and also planned maintenance, repair, refurbishment and renewal, and provision for replacement of the asset.

In 1994 the incoming government evaluated the imbalance in access to built environment infrastructure and facilities that characterised the nation, and embarked on an ambitious plan to put matters right by addressing the backlog. For example, the government has over the years invested significantly in providing water to 15 million people. Other infrastructure provided at the same time, such as sanitation and road infrastructure, has further improved the quality of life of the people of South Africa. Government is committed to increase the levels of infrastructure investment at national, provincial and municipal government level as a foundation for service delivery, economic growth and social development.

The blueprint for a new South African Economy, the *Accelerated and Shared Growth Initiative for South Africa* (ASGISA), identified six 'binding constraints', which, if removed or mitigated, would have a considerable effect on accelerating and sharing growth in the short to medium term. One of these is the provision of infrastructure. Clearly, the impact of increased infrastructure investment would be negated should that or other existing infrastructure fail to deliver services and therefore ASGISA recognises the need to simultaneously address backlogs for investment in maintenance and in new infrastructure.

Government should not change its focus on new built environment infrastructure and facilities to address backlogs from the past. The challenge is to supplement the creation of new infrastructure and facilities by, at the same time, also focussing on the maintenance of both new and old.

All spheres of government, as well as the SOEs, face the challenge of operating and maintaining infrastructure. Some public sector institutions maintain their infrastructure at a high standard – their budgets are adequate (even if barely so), skilled staff are in place, leadership is committed and policies support sound infrastructure maintenance practices. Other institutions have lagged behind, but the risks of this are recognised and in some sectors maintenance needs are being addressed by targeted programmes.

Despite the good performance in some sectors, there is strong evidence that in other sectors much of the infrastructure, of both pre- and post-1994 vintage, is not being properly maintained. Older infrastructure is often not being refurbished and renewed when it needs to be and there is also inadequate planned preventative maintenance of both new and old.

Generally, the larger institutions are performing the best with regard to maintenance, for example, DWAF water resources, the larger water boards, Airports Company (ACSA), Telkom, Eskom, national roads (SANRAL), Transnet and most of the metropolitan municipalities. In contrast, some services in some of the rural-based municipalities have already failed.

From an accrual accounting perspective, there is no real saving in reducing maintenance budgets, because the resulting loss in asset values is invariably greater than the saving in maintenance. Furthermore, there are other significant costs associated with inadequate maintenance and consequent breakdowns. These costs could include loss of production and consequent economic loss, health risks, injury or loss of life and the cost of alternative emergency measures needed during breakdowns.

Given that some public sector institutions are not likely to be able to improve their maintenance policies and practices without strong direction and assistance from national government, a holistic national infrastructure strategy is needed to ensure that all existing and new infrastructure is maintained in good working order.

As noted, reviews have been undertaken of the state of infrastructure and facilities, the state of their management and current initiatives to enhance maintenance (Public Works, 2006; SAICE, 2006; CIDB *et al.*, 2007). These reviews revealed that maintenance of the stock of infrastructure that is owned by government and its agencies varies greatly from sector to sector and often also from institution to institution within a sector. Specific sectors have their own unique challenges.

Those infrastructure and facilities sectors have broadly been identified that constitute the greatest challenges in terms of issues such as:

- severity of problems and how frequently they are experienced;
- lack of effective countermeasures in the event of failure of the service;
- effects on human health and economic growth; and
- the risk generally to government's growth objectives.

Wastewater treatment works are of particular concern. Other sectors of concern include water treatment works, water and sewer reticulation, on-site sanitation, some provincial and municipal roads and some provincial health and education facilities. These sectors must be the main focus of assistance. Unless operation and maintenance are improved in these sectors, very substantial resources to address repairs and unplanned replacements (as opposed to planned, preventative measures) will ultimately have to be found from capital budgets. These unplanned interventions, which would have been unnecessary if the required operation and maintenance had been carried out, will severely limit the programme for addressing backlogs and expanding service delivery.

Response to the challenges

It is evident that a holistic national infrastructure maintenance strategy is needed. Whereas the better of the public-sector institutions are on the path to sustained infrastructure service delivery through maintenance improvement, it does not seem that others will be able to improve their maintenance policies and practices without strong direction and assistance from national government.

The National Infrastructure Maintenance Strategy, prepared by the national Department of Public Works with the assistance of the CSIR, was approved by Cabinet in August 2006 (DPW *et al.*, 2006). This Strategy sets overarching policy for sector-based initiatives and sets out the framework for a coordinated programme of actions. Part of the framework is the 11 priority actions, grouped as follows:

- Strengthening the regulatory framework governing planning and budgeting for infrastructure maintenance.
- Assisting institutions with non-financial resources.
- Developing the maintenance industry.
- Strengthening monitoring, evaluation and reporting, and feeding this into a process of continuous improvement.

The aim of this Strategy is to promote sound maintenance of infrastructure and facilities across the whole of the public sector. While it will assist and set parameters for all public-sector institutions, its primary target is those institutions that are failing in the performance of their duties as the custodians of the public built environment.

Simultaneous infrastructure investment and maintenance that will result from implementation of this strategy will not only improve infrastructure performance and underpin services sustainability, but will also contribute significantly towards national and local economic growth and will create and sustain long term employment.

The National Infrastructure Maintenance Strategy can be seen as the 'umbrella' strategy. The intention is that the national government departments, respectively responsible for each of the sectors of the built environment, take the lead in formulating built environment or infrastructure asset management strategies,

and in implementing these – complementing each other and the National Infrastructure Maintenance Strategy.

One of the first sector lead departments off the mark has been DWAF, as described immediately below. But DPLG, responsible as it is for local government, has also taken the initiative and in 2007 published *Guidelines for infrastructure asset management in local government* (DPLG, 2007). National Treasury, also, has for some years been taking measures to increase provincial and local government accountability for assets.

DWAF has followed an exemplary process in its formulation of a national water services infrastructure asset management strategy. It commenced this process with a 'scan' of the state of South Africa's water services infrastructure and the state of its asset management. Findings were rigorously analysed, identifying elements needed for an enabling environment to ensure sound asset management. This was followed by the identification of a set of priority strategic actions, taking cognizance of DWAF's mandated responsibility and what DWAF needs to do within its own sphere and also in conjunction with others, particularly with other national government departments.

At the time of writing (July 2008), DWAF is formulating and programming the more detailed actions and in all of this cooperating with key stakeholders such as National Treasury, DPLG and SALGA.

Professional bodies such as the Institution of Municipal Engineering of Southern Africa (IMESA) and the Water Institute of South Africa (WISA) have also been very active in promoting infrastructure asset management.

Of wider importance than programmes targeted at individual sectors, the Government Immovable Asset Management Bill (GIAMA), also sponsored by the Department of Public Works, was passed by both Houses of Parliament last year, and at the end of the year the President signed it into law (Act 19 of 2007). The Act will be binding on national, provincial and local government and will guide improved public sector infrastructure asset management.

Management of the built environment: A strategic tool

That increasing attention is being paid to built environment asset management is timely. The recent efforts to discover and document the state of infrastructure and facilities serve to underline the urgent need to take action.

However, while the importance of the provision of built environment infrastructure and facilities to support socio-economic growth has been well recognised within government, the potential that its management has to be a powerful tool of economic growth and service delivery needs to come more to the fore.

Maintenance must be regarded as a strategic tool to promote improved service delivery, to unlock funding to extend infrastructure to historically disadvantaged communities and to support the nation's economy. Maintenance of existing infrastructure should not be seen as of secondary importance to the sometimes politically more attractive prospect of constructing new facilities.

Appropriate maintenance also creates jobs. Maintenance needs to be done year after year and personnel to do this maintenance will, therefore, always be needed – not just for the limited period of construction,

but also for the whole of the designed life of the infrastructure. Furthermore, much maintenance can only be done, or can best be done, by labour-intensive methods and it is thus important that government's plans for employment creation and the Expanded Public Works Programme give prominence to maintenance. There is substantial scope for maintenance contracts to promote small-, medium- and micro-enterprise (SMME) development, Broad-Based Black Economic Empowerment (BBBEE), involvement of women and youth, and local employment coupled with appropriate enterprise development.

Based on a conservative estimate of 12 equivalent full-time jobs for a year per million Rand, a maintenance budget of R10 billion would provide employment to approximately 120 000 people for a year. Where labour-intensive methods are appropriate, for example, on selected civil engineering works, much greater levels of employment are attainable (approximately 50 jobs per million Rand).

Maintaining infrastructure comes at a cost, but clearly, this is a prudent investment which will save significantly in the medium to long term and will promote both economic and human capital development. Not forgetting that, as noted at the start of this paper, poor infrastructure management threatens planning goals.

Conclusions

South Africa has some world-class public-sector built environment infrastructure and service delivery, but also has an increasing amount of deteriorating infrastructure together with poor and often unacceptable quality services. Similarly, some infrastructure owners have world-class policies and practices in place in respect of many aspects of the management, while on the other hand, many do not have even the basics in place and gross shortfalls in management policies and practice exist. Between these two extremes, the full range of capacity and competence can be found.

The two principal systemic issues underlying inadequate provision for long-term management and maintenance are:

- inadequate budgets; and
- inadequate skills (and especially technical skills) and experience.

The competing demands that are made on limited operational budgets (and staff and other resources) severely constrain the adequate management of existing and new infrastructure assets. It would at times almost seem that the dangerous assumption prevails that once infrastructure has been constructed and commissioned, it does not need to be looked after but will deliver a service for years to come despite lack of maintenance, refurbishment and, where appropriate, replacement. This dangerous assumption manifests itself in many ways but in particular in gross under-provision of budgets for management.

Accordingly, if the planned and built infrastructure is to be underpinned by infrastructure and facilities that are adequate and functioning, the following need to be addressed variously across all spheres of government:

- a suitable legislative framework;
- appropriate allocation and protection of appropriate budgets within municipalities;

- a concerted effort to retain trained and experienced staff; review of recruitment policies for key posts; skills training and mentorship programmes;
- the buy-in by national government and other big spenders on, or funders of, public infrastructure;
- the development and implementation of alternative delivery models and delivery agents for infrastructure management where appropriate; and
- the determination of norms, standards, levels of service and key performance indicators for management of the planned and built environment.

Endnote

This paper develops and updates a topic that was the subject of a presentation with the title *Managing the planned environment* made to the South African Planning Institute conference 'Planning Africa 2008' held in Sandton, April 2008.

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