



Engineering the unreached: South Africa

Kevin Wall and Lenyalo Motsei, South Africa

THE ELECTION IN 1994 of Nelson Mandela as President of South Africa was formal recognition that apartheid was dead after decades of turmoil. But it also meant new expectations - that social and economic inequalities, largely the legacy of apartheid, be removed.

Some of these demands concern education, equalisation of opportunity, and health. But key demands are for land, engineering services and housing.

South Africa is not exempt from the pressing problems associated with high population growth rate, extensive urban and rural poverty, and rapid urbanization, that face all developing countries. The nation's cities have much changed since the first national census of 1911, when only 1.5 million people were urbanized. Now, out of a national population (urban and rural) of 42 million, 26 million are urbanized, the great majority of these in the four major metropolitan areas (viz the Pretoria/Witwatersrand/Vereeniging area that includes both Johannesburg and Soweto, Greater Cape Town, Greater Durban and Greater Port Elizabeth).

Many of the urban families now requiring housing and services are poor. Their income is earned largely from the informal sector (i.e. they are irregularly employed or in the employ of businesses that are very small and unregistered), and is often insufficient to pay for even basic services.

Furthermore, the likelihood is that the urban population increase will be greatest among the poorest and least skilled people. The problems created by rural-urban migration are two-pronged. First, there is the overcrowding in the formal "dormitory" townships. Second, squatter settlements with no proper infrastructure sprawl along the periphery of all major cities.

That South Africa has, for Africa, a relatively high order of infrastructure is small consolation to the 30 per cent (nearly 8 million people) of South Africa's urban population without an adequate sanitary facility. 57 per cent had waterborne sanitation, with 13 per cent using in-between facilities such as ventilated improved pit latrines, septic tanks, aquaprivies, or chemical toilets. An additional 7 per cent had access to facilities that were otherwise adequate, but had to share with one or more other families. (Ministry in the Office of the President, 1995.)

Another legacy of apartheid is the costly physical and functional separation of residential and employment locations. This imposes inhibiting transportation costs, particularly on the working classes, and reduces their quality of life and effective economic participation.

Challenges and opportunities

Expectations are for engineering services

Many people have high expectations as to the extent that political change will bring rapid improvement in their economic circumstances and quality of life. These expectations are, with the best will in the world, not likely to be met; certainly not within a few years. This is dangerous for the new government, as much support is no doubt conditional upon "delivery".

Of great concern to engineers is the fact that so many of these expectations are for engineering services. The immediate need is for more housing, water, sanitation, roads, stormwater and electricity, and for processes of design and construction that far better than before.

- Enable the communities to express their preferences and participate in decisions of significance.
- Maximize income-earning opportunities in the community (e.g. use of local labour, and of local entrepreneurs in construction and materials supply; for original construction, and for upgrading and maintenance).
- Reduce costs (e.g. through sweat equity (such as the beneficiary family contributing their own, unskilled, labour for building their house) and innovative design, construction and financing methods).

The pressure is very much on engineers to provide the tangible evidence of the value of the new political course that South Africa has of recent years been following. The politicians will be looking for ways to deliver on their promises of a better life. Engineering services have the merit of being material and visible and (resources permitting!) being replicated on a large scale and touching all political constituencies.

If results of the political change in South Africa are long in becoming apparent, many people will lose faith in that change. Engineers are thus crucial to ensuring peace and stability in the "new" South Africa.

Strategic vision

A strategic vision has been provided in the form of the Reconstruction and Development Programme (RDP), to which all tiers of government must conform. Principles include "empowerment" of communities, positive discrimination to give "previously marginalised people" (i.e. the "unreached") greater opportunities, the use of labour-intensive rather than machine-orientated construction, stimulation of smaller businesses and subcontractors, and enhanced training in projects. Provision of serv-

ices to unreached communities follows the principle of "some for all, not all for some". (African National Congress, 1994.)

Approaches to engineering service provision

Given the above strategic vision, approaches to service provision are being incrementally formulated. These approaches are:

- holistic;
- functional;
- institutional;
- philosophical.

Holistic

Service projects must be identified holistically, and then be part of a broad programme.

The point is best illustrated by an example of how even some of the new government's sector policies are too narrowly focussed. For example, the draft White Paper on sanitation policy more than adequately covers institutional issues, and social and educational issues such as health promotion. Its multi-sector proposals are very encouraging. The fact that the White Paper states that "sanitation goes far beyond the toilets", and that it is critically affected by matters such as personal and cultural hygiene practices, represents a very substantial advance on the accepted engineering thinking of only a few years ago. (National Sanitation Task Team, 1995.)

Nevertheless, the White Paper does not address that sanitation itself is in a context. If "more health" is the objective, then sanitation is only one of a set of interrelated measures for will achieving this objective. Investment in sanitation in a community must be part of a package of interventions. These include investment in water supply, air pollution, nutrition and employment creation - one or another of which *could* be a more cost-effective way to "more health" than the provision of sanitation. The White Paper does not address how sanitation policy and government proposals on sanitation provision would mesh with programmes for funding of other engineering infrastructure and the provision of complementary services (such as curative health).

Functional

This approach relates to how things are done - for example in respect of community participation in the processes of development.

Engineering service programmes have in the past been provided for the marginalised communities without them being consulted. The approach now is for community participation to take the form of "social compacts", which are multilateral development agreements, always including the community representative organizations and the developers.

An important element often unrecognised in community participation is the specific interest of women who

constitute a significant majority of the poor and unreached in South Africa, as they do the world over. Increasingly, families are solely supported and headed by women. Women play multiple roles which include community management, in turn including providing basic services and shelter for their families. In its quest for a non-sexist society, South Africa recognizes the need to involve women more directly in development planning issues. The recognition is evident in the creation of the National Women's Coalition, which has drafted a Women's Charter, a document articulating women's interests.

Institutional

Building new institutional structures for service provision is a particular challenge to the new government. Not only are many of the new players unfamiliar with existing "ground rules", but "it is not enough simply to teach them the rules, since one of their policy objectives is to make radical changes to the rules of the game, which previously kept separate teams playing in different stadiums" (Muller, 1993). Furthermore, officials and even private sector professionals are in danger of being identified by the new players as part of the old team, which may imply that the advice that they give, even engineering advice, is not trusted to be value-free.

Many of the new political leaders lack skills in and experience of local government administration. Many of the community organisations lack these and also lack access to basic administrative tools such as faxes and typing facilities. Many of the unreached have had more experience of "resistance" (to apartheid) than of development. All of these obstacles must be overcome, if institutions are to play a positive role.

Improved practices arising from new management of the residential areas that formerly fell under the separate local authorities for Black persons will within the next few years lead to improved operation and maintenance of existing engineering services. It is to be hoped also that, given governments (at all tiers) that are regarded as legitimate, there will be a sustained improvement in consumers' willingness to pay for services. However there is no certainty of this, and indeed "municipal service payments [and rental payments] have dropped sharply ...; [for example] Soweto payments declined from 34 per cent in July [1995] to 23 per cent. In April [1996]." This is despite the campaign (dubbed "Operation Masakhane") that is driven by central government and supported by all leaders, from President Mandela downwards. The campaign is said to be " failing because of the poor state of the economy, problems in informal settlements, lack of access to paypoints and an inadequate billing system." ("Business Day", 1996.)

Philosophical

This relates to issues such as the allocation of scarce resources, equity and the need to move from group interest to community interest.

“Meeting basic needs”, is the first-named of the government’s six “interlinked policy programmes” that comprise the RDP.

Shortage of resources will limit the rate of upgrading and new construction of engineering services. Affordability will limit both physical improvement and more realistic pricing where this is considered desirable. It is imperative therefore that levels of service be carefully selected, bearing in mind:

- Total available resources.
- The need, in the interest of *all*, to rapidly address at least the worst areas of backlog.

Minimum levels would need to be established primarily on the basis of public health, safety and environmental considerations. What these levels would in practice be would depend on the context of time and place. One may expect official guidelines to emerge - for example, a definition of “basic adequate services” in respect of water as “potable water supply of 25/person/day within 200m cartage distance”. (Department of Water Affairs and Forestry, 1994.)

The newly created local government structures, the boundaries of which cut across racial lines, inhibit the expression of narrow, racial self-interests. To meet the basic needs of the previously unreached communities, administrations must collectively mobilize resources (capital and human) and assert community interest over group prerogatives.

The role of the engineering profession

Although large sums of money have been spent on the provision of housing and infrastructure in the poorer urban areas, many of these projects have not been as successful as their engineers expected.

Often, the problem has been the lack of institutional and community capacity. What is a community? Who and where are its legitimate leaders? What infrastructure does the community most need? Difficulties have also been experienced in the definition of levels of service for engineering infrastructure, the methods of construction (e.g. employment-creating or capital-intensive?), and questions regarding affordability and who pays.

Perhaps more disturbing has been the frequent inability of engineers to consider the implications of the four approaches noted above. Difficulties have been experienced in structuring appropriate technical solutions. This is not surprising in that engineering education has traditionally concentrated on imparting technical skills, generally to the neglect of financial, communications and socio-political skills. It is clear that engineers, if they are to cope with the challenges, have to acquire new skills and new perspectives. Some of these can be obtained from formal education, while others can only be the result of creative thought being applied to professional practice. Far-seeing educational institutions and employers have pioneered innovative approaches which others of their peers are now following.

It has been argued that a profession in which White males outnumber all other groups combined cannot as adequately address South Africa’s needs as could a more representative profession. This contention has substantial, but only partial, validity, and furthermore there are limits to what can be done about it in the foreseeable future. First, whereas representation of other groups in the profession has deservedly made remarkable progress in recent years, average rates per 1 000 population of reaching tertiary education levels are much lower for Blacks (primarily because of economic disparities). Also, relatively few Blacks that reach tertiary education take up engineering, because of a perception that greater rewards lie in other professions. Nevertheless, much more effort must be made to target promising Black scholars and assist them (through financial assistance, after-hours tuition, and training in a work environment) to study engineering. Second, once the post-election administration, still in a transition process, is in place, and reconstruction gains more momentum (and assuming that funding levels are sufficient to meet even selective and interim expectations), the nation’s engineering expertise will be inadequate in quantity even if *all* of it is fully utilized.

Conclusions

Many South African communities have in the past rejected services solutions imposed from above, however technically sound they might have been. In this context, engineers will only be able to bring the benefits of engineering to these unreached communities if they can combine technical soundness with socio-political sensitivity, and the ability to couple physical development with human development.

Special efforts are being made to educate the new generation of engineers, in order that they may be the extraordinarily able, empathetic and inventive practitioners that are required.

The biggest challenge facing engineers in the years ahead will be the provision and maintenance of a soundly based urban infrastructure:

- for a growing population;
- and more representative institutions;
- within severe budgetary constraints.

The profession *must* succeed in this. The chasm that still exists between the engineering classroom and what happens in practice (in communities) must be bridged. More innovative approaches to providing services to the unreached must be developed, where the beneficiaries themselves become part of the service provision planning process. The beneficiary groups must in turn honour commitments that they may make, such as to pay for the services.

Peace, stability and continuance of service provision depend on this collaborative effort between engineers (and allied urban professionals) on the one hand and the beneficiary “unreached” group on the other.

References

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