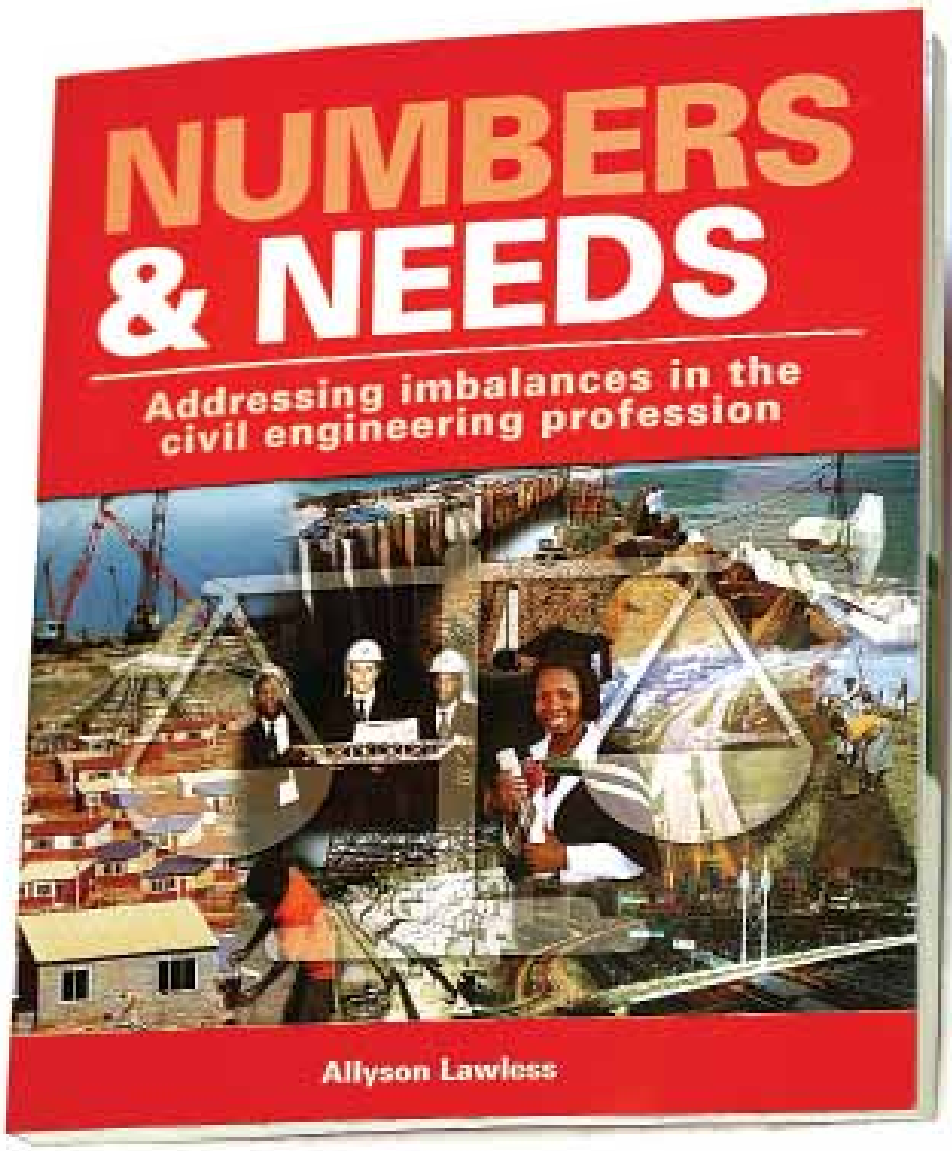
A wake up call

to address the capacity crisis in SA civil

The nation's economy and the quality of life of its citizens depend heavily on the supply and efficient operation of infrastructure. Yet the civil engineering industry faces unprecedented challenges in attracting, recruiting and retaining the staff needed to design, manage and deliver this infrastructure. Allyson's book presents statistics and bottlenecks identified from 24 months of detailed research. It seeks to make practical recommendations in terms of education, learnerships, training, coaching and mentoring, as well as suggesting how to attract and retain professionals to develop sufficient civil engineering capacity to unblock bottlenecks. This is an excerpt from her groundbreaking report



DECLINING NUMBERS

There has been a slow decline in the number of civil engineering professionals (engineers, technologists and technicians) since the infrastructure development hey-days of the sixties and seventies. Factors such as reduced industry demand, reduced numbers of graduations, emigration, and low rewards have meant that personnel have left the market at a higher rate than those entering through tertiary institutions and immigration.

'Scarce skills' and 'skills gaps' are the current buzz words while the country

The SAICE publication **Numbers & Needs: Addressing Imbalances in the Civil Engineering Profession** by Allyson Lawless was launched in Midrand in October. The document covers a mega research project by Allyson and many other researchers into the capacity of the civil engineering profession and the factors that will define and drive civil engineering and infrastructure delivery in the next 10–15 years. The book is full of ideas and recommendations for individuals, companies, industry and government on how to tackle the skills shortage and as such should be compulsory reading for HR managers, politicians and practitioners, as well as management as a whole

engineering

grapples with capacity issues. The research indicates that many fundamental activities relating to the attraction, education and training of professionals are no longer in place or are inadequate. No long-term capacity planning has been carried out.

Unless the standard of education and training from kindergarten to retirement is adequate, competence in engineering and decision-making can never be achieved or maintained. Several aspects require attention, from English and mathematics in schools all the way through to tertiary education, graduate training, working conditions and continuing professional development.

THE STATUS QUO

Demand

Civil professionals are employed in many sectors (see figure 1). All sectors reported staff shortages, particularly of experienced mid-career professionals who are required to execute major projects and transfer knowledge to junior staff.

The private sector

The consulting sector reports that the current workload and continual reduction in staff has meant that capacity utilisation is now over 90 % on average and in excess of 100 % in many practices. Over 80 % of the consulting practices were seeking experienced engineers. In terms of equity goals, all were searching for black engineers, while 50 % were also looking for technicians and technologists.

The public sector

Shortages in all tiers of government are even more acute.

Local government has been particularly hard hit as a result of a number of factors, including budget constraints, restructuring, increased bureaucracy and pursuing equity targets.

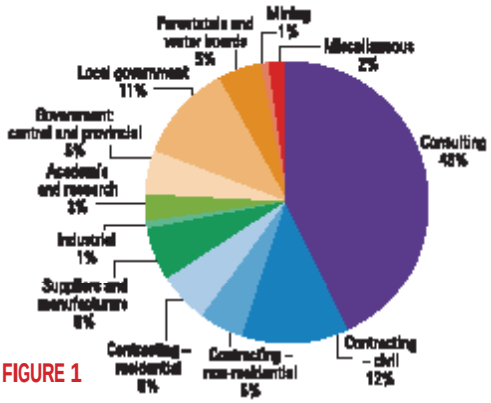


FIGURE 1

At least 800 to 1 200 more civil engineers, technologists and technicians required in local government alone

A census of all local and district municipalities and metros yielded the following statistics:

No civil professionals

- Of the 231 local municipalities 79 have no civil engineers, technologists or technicians
- Of the 47 district municipalities 4 have no civil engineers, technologists or technicians

Only one civil technician

- Of the 231 local municipalities 42 have only one civil technician
- Of the 47 district municipalities 4 have only one civil technician

Only young staff

- Of the 231 local municipalities 38 employ only technologists and technicians under the age of 35

Between 3 000 and 6 000 additional civil engineering professionals needed in the next few years

- Of the 47 district municipalities 6 employ only technologists and technicians under the age of 35

Only 70 with civil engineers

- Only 45 of the 231 local municipalities have any civil engineers
- Only 25 of the 47 district municipalities have any civil engineers

The vacancies that were identified mean that 800 to 1 200 more civil engineers, technologists and technicians are required in local government.

Shortages in provincial and central government are no less acute. Provincial structures reported posts that have been vacant for seven years and more.

Parastatals also reported significant vacancies. Transnet is particularly concerned about its capacity to deliver the new and upgraded infrastructure that is required. The total number of technical staff currently employed by Spoornet is less than half the number that was employed on the construction of the Witbank–Richards Bay Coal Line alone.

Growth and capacity

Given that R200 billion or more is to be spent on infrastructure in the next five to seven years, the view is that the civil engineering industry is entering a long-term growth phase. This growth will continue beyond 2010 because an expansion of infrastructure, upgrading of basic services and maintenance of the much extended network will be required.

However, if appropriate interventions

At the launch

Allyson presents a copy of her book to Dr Rob Adam, Director General, Department of Science and Technology, speaker at the launch

A bouquet of thanks to Marthelene Buckle. This was one of several that went to members of the team who made all this possible

Six thousand professionals have been lost to the industry through emigration, earlier retirement, or better prospects

are not made now, the projected growth will not be achieved and, worse still, continued vacancies in local government will mean that existing infrastructure will be rendered worthless.

Drivers

The current drivers on the demand side are Gautrain; the Soccer World Cup of 2010; the Eskom and Transnet expansions; the huge challenges of Nepad and the Millennium Development Goals; and private sector developments.

In total South Africa will need between 3 000 and 6 000 additional civil engineers, technologist and technicians, depending on whether projects are to run concurrently.

Supply

Around 15 000 civil engineering professionals are currently practising in South Africa. The profiles show three major trends, but the most important is probably the age distribution (see figure 2). The current profile shows a large group of experienced engineers in their late forties and older. This presents many problems, inter alia that there are insufficient mid-career staff to carry out production work and that a large percentage will be retiring in the next ten years, further reducing capacity in the industry.

The age profile problem is not unique to South Africa. However, elsewhere in the world retirement ages are being raised to retain the expertise, while increasing numbers of young people are being trained. By contrast, in South Africa this expert group is being retired early, for various reasons, including limited budgets and chasing equity targets.

THE CHALLENGES

Bottlenecks – capacity supply chain

Actions urgently need to be taken to ensure an adequate flow of entrants into the industry. Unfortunately there are bottlenecks at every step of the way.

- **Matric maths, science and English** Many professions, including civil engineering, require competence in these three subjects. To qualify for university entry, matriculants are expected to attain an A, B or C in higher grade maths. Few achieve this and competition for this select group is fierce from many other engineering disciplines as well as medicine, accounting and the natural sciences.
- **Tertiary education** Having achieved the results required for tertiary education, students still face many hurdles before graduating. The drop-out rate is very high – up to 70 % at some institutions.
- **Challenges facing graduates in the workplace** Having graduated, new entrants to the workplace face many more challenges before they can become technically competent and progress in their careers.
- **Retention in the workplace** The conditions of employment of professional staff have deteriorated over the years and have now reached a crisis situation. Staff retention has become a major problem. For example, senior staff in all organs of state continue to be offered early retirement packages in order to address budget constrain and the equity challenge. Since black students began to enter tertiary institutions in significant numbers only from the mid-nineties, there are few experienced black professionals to fill these posts. The posts remain empty, or

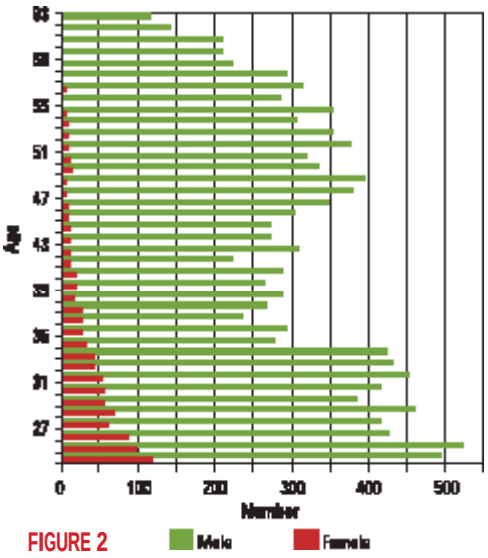


FIGURE 2

are filled by inexperienced young graduates or non-technical staff who are unable to train juniors, or drive the roll-out of projects.

At least 6 000 educated and trained staff who have graduated since 1963 have been lost to the industry. A large percentage have emigrated, and the balance have taken early retirement, or moved into other, more lucrative sectors.

The construction industry employs some 400 000 people. In local government and water boards a further 125 000 or so are involved in civil engineering infrastructure. The ratio of civil engineers and technologists to the workforce is therefore roughly 1:60. For every civil engineer or technologist who leaves the industry, ultimately 60 jobs are lost.

Government has identified job creation in the construction industry as one of the saviours of the economy. But as long as the bleeding of civil engineering skills is allowed to continue, jobs will be lost. The opposite is also true. Increasing the number

of engineers and technologists will support the creation of more jobs.

Bottlenecks – infrastructure delivery

Although government has published many ambitious development plans and has assigned funds accordingly, they are not being spent. Infrastructure development is not taking place at the required rate as massive and ongoing restructuring within state organs, complex and extensive legislation and a lack of capacity give rise to bottlenecks that hamper these developments.

Bottlenecks – Black Economic Empowerment

The need to create opportunities for previously disadvantaged individuals (PDIs) has been addressed by affirmative procurement. This gave rise to fronting and little broad-based empowerment.

Numbers required

Civil engineering graduations in the past closely tracked civil spending. Since civil spending is on the increase once more, it is essential that there should be a commensurate increase in the number of graduates. Further, to compensate for the disproportionate number of retirements expected to take place in the next 5–10 years, additional graduates are required.

MAIN CONCLUSIONS

- There is a critical shortage of experienced civil professionals, particularly mid-career civil engineers responsible for production work.
- Loss of experience and knowledge must be reversed at senior levels.
- Training is an imperative. Significant effort must be put into education and training from kindergarten to retirement to ensure and maintain an adequate supply of high-calibre professionals.
- Retired professionals should be harnessed to assist with workplace training to develop the rapidly transforming pool of graduates.
- South Africans abroad or who have left the industry need to be encouraged to return to address the increasing shortages identified.

It was distressing to note that all the problems outlined have been raised over and over again, over many years, but little attention has been paid to the millions of rands' worth of reports that are simply gathering dust. It is encouraging to observe a new-found interest and will by leadership at the highest levels to address these issues.

What will happen if the interventions are not made and the status quo is perpetuated into the future?

- Delivery will not be possible and poverty will be endemic in South Africa.
- If adequate water and sanitation infrastructure services are not supplied, waterborne diseases will reach epidemic proportions.
- An increase in transportation gridlock and congestion in ports will hamper trade.
- Political instability will occur, because the growth rate of 6 % and job creation will be not be achievable.
- Engineering will become a career of last choice for adequately qualified matriculants.
- Continual loss of skilled capacity through early retirement, emigration, and moving to other sectors will require South Africa to become a nett importer of engineering skills to the detriment of the rand, investor confidence, the economy and the infrastructure since local knowledge and understanding is imperative in civil engineering.

ACTION REQUIRED

The much-debated skills shortage in terms of civil engineering professionals is real and requires immediate action! To succeed will require a collective effort involving political will and the cooperation of all tiers of government, the private sector, academic institutions and the civil engineering workforce.

▶ The report concludes with a logframe setting out the way forward and the actions required from all stakeholders. Use the order form below to secure your copy/copies of the detailed report NOW. This is a must-read for everybody in the industry!

SPECIAL OFFER FOR SAICE MEMBERS

TITLE	PRICE (VAT AND POSTAGE INCLUDED)*	SAICE MEMBERS	NUMBER OF COPIES	TOTAL DUE
Numbers & Needs: Addressing Imbalances in the Civil Engineering Profession – Allyson Lawless (272 pages, full colour)	R395 (Students with a valid student number: R195)	R295		

Name:	Company:	
Tel (work):	E-mail:	
Postal address:		Postal code:
Delivery address:		Postal code:
Tax invoice to:		
Signature:	Student number and institution:	

*Mailing: Phone Angelene Aylward (011 805 5947) to confirm registered mail/courier costs, since these are affected by the weight of the order

METHOD OF PAYMENT

- Mail your order form and cheque to Angelene Aylward, SAICE, Private Bag X200, Halfway House, 1685
- Deposit your payment into the SAICE account and fax your deposit slip together with your order form to 011 805 5971 (Standard Bank Business Cheque Account Number 200 853 058, Parktown Branch Code 000 355)