

# **Incorporation of training and skills development in the execution of the South African National Infrastructure Plan**

**9<sup>th</sup> World Congress on Engineering Asset Management – WCEAM 2014**

*Category "A" paper.*

*Recommended tracks: "EAM strategies" and "EAM education and training".*

Sihle Dlungwana<sup>1</sup> and Kevin Wall<sup>2</sup>

## **Abstract:**

The paper describes a proposed framework for the incorporation of training and skills development in the execution of the South African National Infrastructure Plan of the Presidential Infrastructure Coordinating Commission.

Following an introduction to the Plan, the paper offers a CSIR view of the "skills development problem". The paper then describes a desktop study which the CSIR conducted to evaluate and compare South Africa's contractor skills development framework with the frameworks of 11 other countries. Finally, the proposed framework for managing skills development – especially that supportive of small, medium and micro-enterprises (SMMEs) – is described.

## **1. Introduction**

In March 2014, the South African Parliament passed the Infrastructure Development Act into law. This Act inter alia:

- provides for a long-range infrastructure planning framework for the nation, rather than the stop-start pattern of implementation which has characterised so much infrastructure development in the past;
- provides for a National Infrastructure Plan (NIP);

---

<sup>1</sup> S Dlungwana (✉)  
CSIR Built Environment,  
Pretoria, South Africa.  
[sdlungwana@csir.co.za](mailto:sdlungwana@csir.co.za)

<sup>2</sup> K Wall  
Department of Construction Economics, University of Pretoria,  
Pretoria, South Africa.  
[kevin.wall@up.ac.za](mailto:kevin.wall@up.ac.za)  
[kevinwall468@gmail.com](mailto:kevinwall468@gmail.com)

- provides for the designation of "Strategic Integrated Projects" (SIPs), which collectively bring together hundreds of construction projects, such as improving schools, opening the northern mining belt, and developing the southeastern coastal regions; and
- describes the mechanisms through which developmental targets can be set for each project and for the programme as a whole – targets in terms of areas such as local industrialisation, job creation, youth employment, the greening of the economy, skills development, rural development and broad-based empowerment.

The scope of the NIP, which is driven by the Presidential Infrastructure Coordinating Commission (PICC), chaired by President Jacob Zuma, is wide, and its impact will be considerable. Initial indications are that the budget will entail expenditure of the order of R1000 billion (approximately 100 billion US dollars) over the next three years.

The Plan has identified five "core functions", one of which is to drive job creation, including "developing the skills to implement, operate and maintain our infrastructure assets".

Another, related, national goal is the growth of the small, medium and micro-enterprise (SMME) sector across the national economy. In the view of the authors, the SMME potential of the construction sector has not been adequately supported. Hence the emphasis in this paper is on both the job creation potential and the SMME development potential of the NIP.

The paper reviews national and international skills development frameworks and conducts some analysis of these frameworks. Based on the analysis, a framework for developing, monitoring, evaluating and reporting on SIP infrastructure-related skills formation is proposed. A case study of a multi-year contractor skills development project which one of the authors project-managed is used as a reference point to strengthen some of the arguments presented in the paper.

The paper addresses the following critical questions, namely:

- What is the nature of the skills challenge in the South African construction industry and what are the benefits of addressing such a challenge?
- What is the best suitable framework for implementing skills formation among enterprises and construction industry employees involved in the NIP?

Skills development is closely related to the other development impact areas identified by the PICC and is thus a key enabler impacting upon other development areas. In formulating the skills development framework, the paper outlines relationships and linkages between skills and other impact areas.

### **The skills development problem**

The South African construction sector is a significant player in the local economy, employing around 1.18 million people in 2014 (Statistics SA, 2014).

Skills resources and needs in South Africa's infrastructure environment, and in various other economic sectors, are well documented (McGrath and Akoojee, 2007; Kraak, 2005 and cidb, 2007). The prevalent view is that improving skills has a direct positive correlation to economic growth, employment creation and reduction of poverty and inequality. Kraak

(2005) perceives human resources development and skills shortfalls in South Africa to be of crisis proportions.

Poor business management and poor project management are blamed for a number of project performance-related problems (CIDB 2009), including:

- Poor quality of workmanship which compromises structural integrity of buildings and safety of the occupants;
- Time and budget overruns resulting in late completion of projects and delayed occupancy of buildings; and
- Budget overruns resulting in reduced impact and compromised service delivery.

These challenges are an indictment of a number of construction role players (including the clients). Poor business management skills also account for the high rate of failures in the sector .

Many unskilled workers are vulnerable, often finding themselves badly treated by unscrupulous employers. In the construction industry where working conditions are often difficult, unsafe and unsociable, many unskilled workers are highly affected by diseases such as HIV/AIDS and other sexually transmitted diseases (STDs), and are also prone to work injuries and accidents.

Training will go a long way to addressing such challenges, although, clearly, other measures are also needed, such as financial incentives to improve performance.

### **Profile of skills in the South African construction sector**

Implementation of the NIP will require a broad spectrum of construction sector skills (DHET 2014), many of which would be employed by SMMEs. The range covers engineers, technologists, artisans, machine operators, drivers, managers, entrepreneurs and administration-related staff.

The list of skills types which follows is not exhaustive. Whereas many other types of skills will be identified, the framework suggested further on in this paper will outline the training and development of such additional skills.

#### Conventional construction skills

The construction/ infrastructure environment relies on a vast array of technical and engineering skills from engineers, project managers and architects at the high-level end, to artisans at intermediary-level, and charge hands, operators and drivers at low-level end.

The national demand for adequately skilled employees possessing such skills is high while the supply is not sufficient in meeting such demand.

#### New types of construction skills

The need for construction skills of at least two new types will assume increasing importance. As follows:

- Increased introduction of innovative building technologies (IBTs) is likely to see eradication of much on-site work. Workers are likely to relocate from site environment to factory environment where they will use manufacturing equipment and systems. For example, the ordinary brick layer in the traditional construction economy will require skills to assemble wall panels – a significant shift in competence.
- The green construction economy also demands new skills. For example, skills suited to the construction and installation of new energy systems (e.g. solar), systems for resource reuse and recycling, and insulation materials.

New design skills will also be required, to accommodate not just the above construction methods, but also new methods of communication and new developments in ICT. In the higher education infrastructure sector, for example, the gradual shift to what is referred to as "distance learning" (as opposed to "contact learning") changes the quantum of space required for the same number of students, and also changes the types of space – including the equipping of those spaces.

This new environment requires shift in skills requirements, thinking and working methods for not only the technical employees but all the human resources involved in the delivery of future infrastructure.

#### Occupational health and safety skills

According to the Department of Public Works (DPW, 2004) and the South African Business Coalition on HIV/AIDS (SABCOHA) the construction sector is the sector most affected by HIV/AIDS after mining, manufacturing and transport sectors while also being the least responsive in terms of development and implementation of HIV/AIDS treatment policies (BER/SABCOHA, 2005).

Bowen *et al.* (2010), cites George's (2006) overview of the modelled HIV infection percentages and AIDS deaths per 100 workers for the period 2000-2015. The construction sector is shown to perform poorly, with prevalent rates of 23.9% in 2005 and 22.1% in 2010. Death rates in 2005 were 1.7 per 100 workers per annum, projected to rise to 2.1 by 2015. The prevalence of HIV remains unacceptably high, in spite of a decreasing rate of new infection, and it therefore constitutes a huge threat to the industry, requiring proactive training, awareness and treatment programmes.

#### Entrepreneurship skills

Training of managers and/or technical staff is not the same as training entrepreneurs. This fact is seldom appreciated in the design of many training programmes in South Africa. With the need for job creation and more entrepreneurs being huge, it is imperative that emphasis be on integration of more entrepreneurship skills into the training framework, especially at the level of SMME development programmes.

It is the authors' contention that even at the level of artisan training, craftsmen should be given entrepreneurial skills. Such artisans could then go on to open their own small enterprises, thus creating further employment for others.

## **2. Review of skills development frameworks**

### **International review of skills development frameworks for SMMEs and workers**

An international desk-top study of 11 countries evaluated and compared South Africa's contractor skills development frameworks vis-à-vis frameworks of other countries (Dlungwana 2010). In particular, the study reviewed the frameworks and policies of the South African government; International Labour Organization (ILO); and the activities of various role players in selected countries, namely, South Africa, Tanzania and Egypt (African countries); Hong Kong, India, Malaysia and Singapore (Asian countries) as well as Australia, Canada, Germany, United Kingdom and the United States of America (developed countries).

The study covered activities relating to the key development factors, namely culture of entrepreneurship, technical and management skills, capital and credit as well as technology. The role of governments and industry stakeholders in promoting the development and growth of small contractors was studied. Support strategies relating to the development of a culture of entrepreneurship, skills, capital and technology and innovation were also investigated. The following sections represent a summarised discussion on the findings of the study.

It is clear from the study that there are various aspects to promoting the development and growth of construction workers and small construction contractors. While there is a global shortage of skilled construction employees, South Africa is particularly hard hit. Worker training in both technical and construction management skills is highly promoted in Asian countries and developed countries, with apprenticeships playing a significant role. Many countries are also engaged in contractor development programmes.

#### Availability of opportunities for workers

Many countries offer opportunities to students and their workers to do apprenticeships. Germany's dual education system offers learners at schools the opportunity to study construction trades. South Africa, Canada and Australia have targeted programmes to address historical injustices against indigenous segments of the population.

Courses offered in Asian countries and developed countries tend to be tailored in a flexible way giving learners a variety of choices for acquiring construction skills and knowledge. These courses may be offered on a full- or part-time basis. Mobile training programmes are offered by India's National Academy of Construction (NAC) and UK's CITB.

#### Card schemes and the mobility of workers

Card schemes are important for construction workers and construction contractors. For both employee and employer, the construction card schemes provide a level of certainty regarding the workers competency in construction skills in terms of the expected quality of work. A further advantage of the card schemes is that they facilitate easier mobility for workers providing them easier employability on construction sites. The card scheme thus provides certification for workers competency.

#### Professional development programmes

Employers should make an effort to ensure that their employees, particularly the skilled professionals, are constantly on par with the latest industry developments. This includes keeping abreast of technological changes to ensure that an organisation employs the most effective tools to exploit new opportunities. Continuing Development Programmes play an important part in ensuring that employees enhance their skills.

### Contractor development programmes

Mentor and protégé programmes that provide training to construction workers are offered by various institutions in different regions. While in African countries contractor development programmes are driven by the governments, in developed countries they are mainly driven by the private sector. The South African government invests heavily in the development of small contractors. However, it is often uncertain if the South African public gets value for this investment.

It is apparent from the desktop study and literature review that many countries, especially those in the developed world, do not have contractor development programmes to assist their contractors. The question to address then is “what career route do budding entrepreneurs follow to enter the construction industry and how do they acquire technical and business knowledge and skills to help them sustain their businesses?”

### Support from government and industry

Government assistance is needed to establish an enabling and supportive environment in order to develop and grow small construction workers and contractors. The study has shown that governments in all the reviewed countries, by establishing the necessary committees and institutional structures to oversee functions such as the provision of training and setting of standards, are actively promoting the development of skills for workers and contractors.

The table summarises the roles of government and private sector stakeholders in the promotion and development of the construction worker and small construction contractor, these roles are tabulated in the matrix in Table 2. The measure of the extent of the initiatives is indicated by a nominal scale of strong (S) or weak (W). The scale simply demonstrates the effort of government or private sector organisations and not the impact of such initiatives in terms of how well workers and contractors develop.

### **Support Initiatives for small contractors in selected countries, by government and private sector**

Type of development initiative	South Africa		African countries		Asian countries		Developed countries	
	Gov't	Private	Gov't	Private	Gov't	Private	Gov't	Private
Contractor development programmes (train & support)	S	W	W	W	S	W	W	W
Contractor training (long courses, more than 6 months)	S	W	W	W	S	W	S	S
Contractor training (short	S	S	U	U	S	S	W	S

Type of development initiative	South Africa		African countries		Asian countries		Developed countries	
course, 6 months and less)								
Training (tertiary)	S	S	U	U	S	S	S	S
Training of workers (apprenticeships)	W	W	U	U	S	S	S	S
Training of workers (short courses)	W	W	U	U	S	S	S	S
R&D/ Innovation programmes	W	W	W	W	S	W	W	W
Promoting culture of entrepreneurship	W	W	W	W	U	U	S	S
Providing access to capital	W	W	W	W	W	W	W	W
Providing access to credit	W	W	W	W	U	U	W	S
Providing access to plant & equipment	W	W	S	W	W	U	U	U

*S=strong, W=weak, U=Unclear (no information available)*  
(Dlungwana (2010))

While the primary focus of this study was on contractor development, the study identified a strong link between the training of workers and the development of contractors. At core, the study investigated international practices on the five key factors that contribute to contractor development, namely support from government and industry, culture of entrepreneurship and innovation, availability of capital and credit, knowledge and skills development, and availability of markets.

The data analysis shows that government policies aimed at developing contractors seem to be stronger in selected Asian countries than they are in developed countries and African countries. South Africa, however, fared much better in this respect compared to its African counterparts. Availability of information in the African countries does not allow for good comparison as it is difficult to understand their contractor development activities, but it would seem that many do not have contractor development programmes.

The private sector in developed countries offers a number of development programmes on commercial basis.

Few countries have strong policies for promoting entrepreneurial culture and for providing access to capital and credit to small contractors. Government efforts to facilitate access to credit seem to be a problem in most of the countries. The private sector in developed countries, however, is more willing to extend credit to small contractors than it is in developing countries. The policies for promoting innovation are either weak or absent in many countries that were studied.

In some cases government and the private sector organisations work together on similar programmes. While it is generally accepted that such programmes are important, their impact on the performance and growth of contractors remains unquantified. A critical question to be

answered in future is “What is the impact of government policies on the growth, development and sustainability of small construction contractors?”

In spite of some clear weakness in terms of certain support initiatives, South Africa does possess some notable strengths on government’s skills development policies for contractors and workers. The implementation measures to produce the necessary impact are however not clear and this is where most of the South African government’s skills development effort should go.

To summarise: this review of international and national skills development frameworks, conducted to gauge South Africa’s skills development initiatives against international developments found, briefly, that South Africa has developed a number of good policies and initiatives but implementation of these has not been effective.

For example, many South African public sector clients are notorious for taking a long time to pay their contractors<sup>3</sup> (Amod 2002; Ensor 2012; Mabuntana 2000; Visser 2012). If SMMEs, particularly, are not paid in full and on time, cash flow constraints will kill their businesses. This suggests that training of public sector client staff (not just the finance departments) could be as important as the training of contractor staff.

### **3. Framework for managing skills development**

Based on international and South African experiences as per above analysis, it is clear that the South African government has achieved much in promoting skills development and exploring ideas and theoretical models in the skills development area. There is general growing consensus in South Africa’s public policy debate across a wide area of topics that South Africa’s main weakness is on the implementation of government’s policies as opposed to developing the policies per se.

In view of this growing consensus in the public discourse, the suggestion to the South African authorities would be to refine the existing set of policies and to bring a great deal of focus on the training policy implementation processes and institutions.

A practical approach to this matter would then be for the SIP programme to adopt an existing framework, and implement it, rather than seek to create new framework. It is suggested that the Construction Industry Development Board (CIDB) has developed, and is already in the process of implementing, a ‘Standard for developing skills that result in nationally accredited outcomes through infrastructure contracts’ (CIDB 2013). This ‘Skills Standard’ should be fully endorsed and adopted by SIPs as the flagship to rally the training and skills development activities.

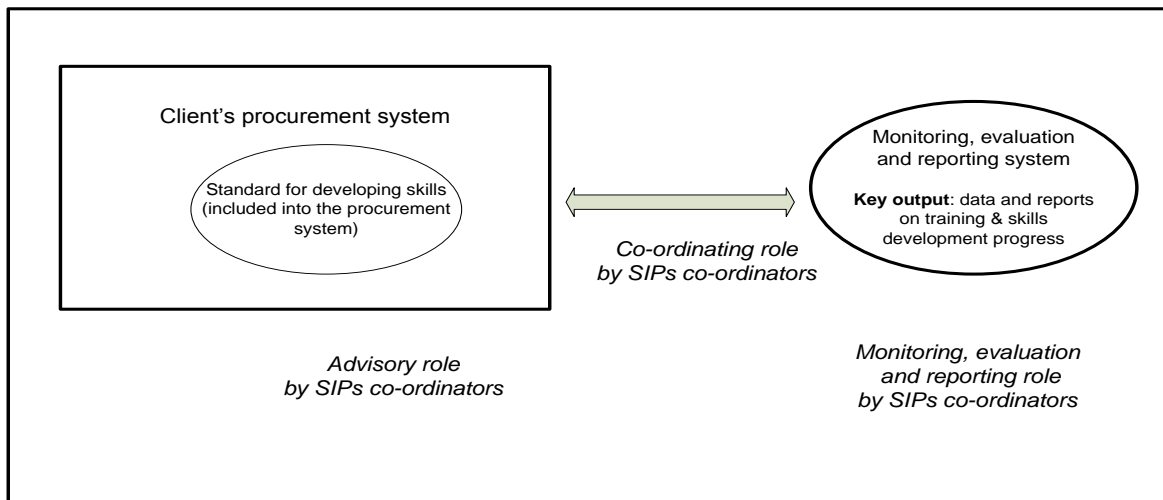
Linked to this Skills Standard should be a Monitoring, Evaluation and Reporting system. The integrated system comprising these components is put forward as the framework for managing skills development in the NIP. It is illustrated below.

---

<sup>3</sup> Even large contractors can go under through non-payment – for example Sanyati Construction. (Allix 2012; Business Day 2012).



## Proposed framework for skills development



The framework comprises three critical components:

- The **procurement/ contracting component**: As part of the procurement process, the client enters into a contract with the contractor/ service provider who undertakes to perform specific training on targeted individuals (i.e. to achieve a targeted training goal). The goal could take the form of a number of trainees receiving specific training which results in an accredited qualification. In addition, CIDB should be playing the dominant role in ensuring that the training standard is properly incorporated into existing procurement systems of public sector clients.
- The **monitoring, evaluation and reporting component**. The framework must incorporate a web-based system to monitor, evaluate and report all key activities and data relating to the training and skills development activity. Key measures are intended to report on progress of the training projects and the impact they have in the community. (In respect of the NIP, the PICC and the national Department of Higher Education and Training (DHET) during 2013 both, in cooperation, took steps to initiate such a system.)
- The **co-ordinating component**: The component ensures that the clients' procurement/contracting systems and the clients' formal monitoring, evaluation and reporting systems are properly aligned and that sufficient and accurate data is captured. (In respect of the NIP, the PICC has appointed an independent coordinator for each of the 18 SIPs, whose role is to improve data collection and accuracy, and also to improve coordination between agencies.)

## 4. Conclusions and recommendations

In spite of some clear weakness in terms of certain support initiatives, South Africa does possess some notable strengths on government's skills development policies for contractors and workers. The implementation measures to produce the necessary impact, however are not strong and this is where most of the South African government's skills improvement effort should go.

It is recommended that the the proposed framework for skills development described above should be adopted and implemented by the PICC. The framework should be implemented in totality, including the rapid scaling up of CIDB's skills development standard, adoption of the standard by key clients, and development and maintenance of the proposed monitoring, evaluation and reporting system.

## References

Allix, M, and Stone, S (2012). Sanyati CEO lifts lid on the chaos that sank his firm. *Business Day*. 18 July 2012.

Amod, S, Thatcher, P J, and Mabuntana, L (2002). Creating an enabling environment for economic development: accelerating delivery through best practices for payment. *Built Environment Professions Convention*. May 2012.

Bowen, P., Cattell, K., Edwards, P.J. and Marks, J. (2010) Perceptions of HIV/AIDS policies and treatment programmes by Western Cape construction firms. *Construction Management and Economics*, 28, 997-1006.

Bureau for Economic Research (BER)/ South African Business Coalition on HIV/AIDS (SABCOHA), (2005) The Economic Impact of HIV/AIDS on Selected Business Sectors in South Africa, 2005. Bureau for Economic Research, Stellenbosch, South Africa.

Business Day (2012). Sanyati applies for bankruptcy protection. 4 June 2012.

Cidb (2007) Skills for infrastructure delivery in South Africa. [www.cidb.org.za](http://www.cidb.org.za)

Cidb (2013) Standard for developing skills that result in nationally accredited outcomes through infrastructure contracts, Cidb, Pretoria.

DHET (2014). Skills for and through SIPs. September 2014.

DPW (2004) HIV/AIDS Awareness Programme: Training Manual of 2003, available [www.gov.co.za](http://www.gov.co.za).

Ensor, L (2012). Departments told to abide by 30-day rule. *Business Day*. 9 November 2012.

George, G. (2006) Workplace ART Programmes: Why do companies invest in them and are they working? *Africa Journal of AIDS Research*, 5(2),179-188.

Statistics South Africa (2014) Quarterly Labour Force Survey, Quarter 2, 2014 South Africa

Kraak, A. (2005) Human resource development and the skills crisis in South Africa: the need for a multi-pronged strategy. *Journal of Education and Work*, 18:1,57-83.

Mabuntana, L, Hodgson, S and Amod, S (2000). Slow payment: the scourge of contractors everywhere. CIB conference proceedings.

McGrath, and Akoojee, (2007) Education and skills for the development in South Africa: Reflections on the accelerated and shared growth initiative for South Africa. *International Journal of Educational Development* 27 (2007) 421-434.

Visser, A (2012). Departments face many hurdles in making payments, hearings told. *Business Day*. 2 November 2012