Application for Designation of the Civil Engineering Sector within the Built Environment Professional Services in Terms of the Preferential Procurement Policy Framework Act

August 2014

Version 2 (Draft)

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Abbreviations

ASGISA	-	Accelerated and Shared Growth Initiative – South Africa
B-BBEE	-	Broad-Based Black Economic Empowerment
BEPEC		Built Environment Professions Export Council
CAD	-	Computer Aided Design
CESA	-	Consulting Engineers South Africa
CIDB		Construction Industry Development Board
ECSA		Engineering Council of South Africa
GDP	-	Gross Domestic Product
GFCF	-	Gross Fixed Capital Formation
IPAP	-	Industrial Policy Action Plan
MTEF	-	Medium Term Expenditure Framework
NGP	-	New Growth Path
NIPF	-	National Industrial Policy Framework
PIDA	-	Programme for Infrastructure Development in Africa
PPPFA		Preferential Procurement Policy Framework Act
RIDMP	-	Regional Infrastructure Development Master Plan
SADC	-	Southern African Development Community
SAFCEC		South African Forum of Civil Engineering Contractors
SMME	-	Small, Medium and Micro Enterprise
SOE	-	State-Owned Enterprise

Executive Summary

Consulting Engineers South African (CESA), together with the Built Environment Professionals Export Council (BEPEC), seeks to have the Civil Engineering Sector as a sub-discipline of the broader Consulting Engineering Sector within the Built Environment Professional Services declared a designated sector in terms of the provisions of the Preferential Procurement Policy Framework Act (PPPFA).

Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams, and buildings. Civil engineering takes place in the public sector from municipal through to national governments, and in the private sector from individual homeowners through to international companies. (Source: en.wikipedia.org). The importance of the civil engineering sector cannot be overstated – civil engineers are responsible for designing and building South Africa's infrastructure which is vital to the country's social, economic and environmental quality of life. Good infrastructure is the key to South Africa's future growth and development as it provides the backbone for industrial development and the creation of logistics pathways that enable international trade and local distribution and the unlocking of stranded extractive resources.

The civil engineering sector is the largest sub-discipline of the general consulting engineering sector. In 2013, some 50% of fee income earned by the consulting engineering sector in general was earned by civil engineers. In 2013, turnover in the civil engineering sector amounted to R5.4 billion (real 2000 prices). The civil engineering industry employed 31% of the total number of employees in the construction industry as at June 2011, according to the 2011 Large sample Survey (Stats SA), or 152 337 employees. This does not include those that are self-employed working in the civil engineering industry.

Designation will allow civil engineering companies to compete on an equal basis with other South African companies. Designation will increase the workload for local civil engineering companies which in turn will give them the confidence to invest in training and development and the employment of young engineers and technicians. Designation will force international companies to work with local partners thereby increasing the skill set of local civil engineers and localizing essential skills required for future development and maintenance of infrastructure.

This application sets out the significance of the consulting engineering sector in general within the context of promoting employment creation, industrialization and empowerment. It further emphasizes the role consulting engineering sector can play in supporting government's infrastructure development programme over the next several years. Once the broad operating environment has been detailed, the application provides a detailed industry profile of the civil engineering sector before outlining conditionalities and enforcement measures for designation.

Civil Engineering and Economic Policy

Economic policy in South Africa has been progressively elaborated over the last several years in an effort to shift the country's growth path from one of low growth with limited employment expansion to one of high growth enabling inclusive participation in the economy. The key policy

shifts include increased public investment in infrastructure, greater focus on re-industrialization through the adoption of specific support measures for sectors with growth potential, and more effective regulation of economic activity in line with the development objectives of the country. The scope and scale of government's investment in line with this policy shift is further elaborated in the National Infrastructure Plan that sets out an integrated, aligned and coordinated 20 year infrastructure pipeline. Infrastructure projects to the value of R3.2 trillion are under consideration between now and 2020 in the different economic infrastructure sectors.

The civil engineering sector plays a crucial role in the effective delivery of projects as the interface between the planning exercise that broadly incorporates decisions on the selection of projects, economic assessments, appropriate design and technology and the implementation of projects. Furthermore the sector has significance for employment creation, industrialization and empowerment.

Impact on Employment Creation

There is a correlation of 0.9788 between gross fixed capital formation (GFCF)) and employment in the civil engineering sector in South Africa. It is estimated that for every percentage spend on GFCF, there is a corresponding 1% increase in employment in the sector. The civil engineering sector employs some 152 337[1] staff. Furthermore, the civil engineering sector can influence employment creation in the construction phase of projects by embracing opportunities for labour-intensive methods and labour-based technologies in the conceptualization and design of projects.

Industrialization

Projects that involve local engineers during conceptualization and design are more likely to make use of inputs produced locally when feasible. This stimulates demand for capital goods, materials, and technical services that are produced in the domestic economy.

Empowerment

The sector continues to move closer to the target of achieving 30% economic interest held by black people and 10% held by black women. Black equity in the sector has increased from 25.3% in June 2006 to 28.1% in June 2012.

Support to the civil engineering sector effectively translates into small business development, given the significant role of the small and medium size enterprises in the engineering sector. More than 50% of firms in the sector are micro and small enterprises employing up to 20 staff. Medium-size enterprises account for a third of all firms in the sector.

Civil engineering firms typically have strong links with institutions that form part of the national system of innovation for sharing information and knowledge about professional and technical developments. In addition, firms tend to be linked into global knowledge networks for the purposes of the technological diffusion of knowledge.

[1] Stats SA 2011

Significance of Public Procurement

The civil engineering industry is very reliant on public procurements with close on 58.2% of revenues in 2013 earned from the public sector. The importance of the public procurement for the sustainability of the sector is even more critical in view of the decline in private sector procurement over the last several years.

Export Opportunities

Exports, particularly exports to Africa are an important aspect of the industry. In June 2012, some 10% of total engineering fees were earned from business in the rest of Africa. Specifically with regards to civil engineering, a little over 50% of civil engineering concerns are operating cross border earning as much as 25% of their income from these markets. There is a leverage effect from South African consultants working regionally. Being at the forefront of project development through the conducting of pre-feasibility studies, South African consulting engineers can be used very effectively to identify bankable projects for SA Inc. This would encompass both service providers such as construction companies and manufacturers of items such as structural steel.

Designation of the civil engineering sector would empower companies and would make them more competitive in competing for Programme for Infrastructure Development in Africa (PIDA) projects regionally. PIDA is an initiative for the development of infrastructure in Africa being led by the African Union Commission, the NEPAD Secretariat and the African Development Bank (ADB). Given the importance of the southern African region in particular to South African business, PIDA will provide an important work stream for the South African civil engineering sector. Designation would give civil engineers the confidence to engage with Africa on PIDA.

Multiplier Effect

The civil engineering sector has a multiplier effect of 1.69 which means that for every additional R1 million spent with the sector R 1.69 million circulates through the economy due to spending of salaries and profits. A job multiplier of 0.64 indicates that for every addition R1 million spent with civil engineers, these firms are able to create 0.64 job opportunities at a civil engineering firm. In view of the interdependence with the construction sector, the multiplier effect in the construction industry has been calculated. For every additional R1 million spent with civil engineers, R1.21 million circulate through the economy 6.2 job opportunities are created in the construction industry.

If one applies this model to the expected construction spend on the MTEF of an estimated R320bn (40% of the total budget) and based on the assumption that civil engineers' fee on a construction project is 12%, the MTEF spend equates to an additional R65 billion circulating through the economy from the civil engineering sector and an additional R341 billion from the construction sector, a total of R406 billion. This further equates to an additional 24,576 jobs in the civil engineering sector and 1,740,288 jobs in the construction sector amounting to total potential job creation of 1,764,864.

Technological Considerations

The core capabilities of civil engineering firms is premised fundamentally on the skills, knowledge and experience involved in the application of scientific and technical knowledge in the design and construction of a project. Thus, the accumulated skills, knowledge and experience of the professionals in the firm or project groups provide the competitive advantage to firms.

The importance of maintaining and growing the engineering skills base in South Africa is critically linked to the development of the knowledge economy in the country and to the international competitiveness of companies involved in infrastructural service delivery.

The Square Kilometer Array Project (SKA) will provide a boost for the knowledge economy. As eloquently elaborated by the Vice-Chancellor of the University of Johannesburg, Professor Ihron Rensburg at the opening of National Science week earlier this year, science and technology are the differentiators between countries that are able to tackle poverty effectively by growing and developing the economy, and those that are not. He went on to say that "The extent to which developing economies emerge as economic powerhouses depends on their ability to grasp and apply insights from science and technology and use them creatively. Innovation is the primary driver of technological growth and living standards,"

Price Considerations

The costing structure of the South African civil engineers is transparent and conforms to ECSA Guidelines. The industry has traditionally been competitive and in most cases, South African skill is priced lower than international counterparts.

Availability and Security of Supply

Within the civil engineering sector the capacity utilisation rate is currently 81.6%. This reflects adequate capacity to cope with the potential increase in the market opportunities linked to the public sector-led infrastructure rollout. Civil engineering companies indicate a number of measures to cope with an increase in demand including the employment of more staff, training and development of existing staff and consolidation of resources. More importantly, there is room for growth and development within the sector especially with the confidence designation will provide.

Conditionalities

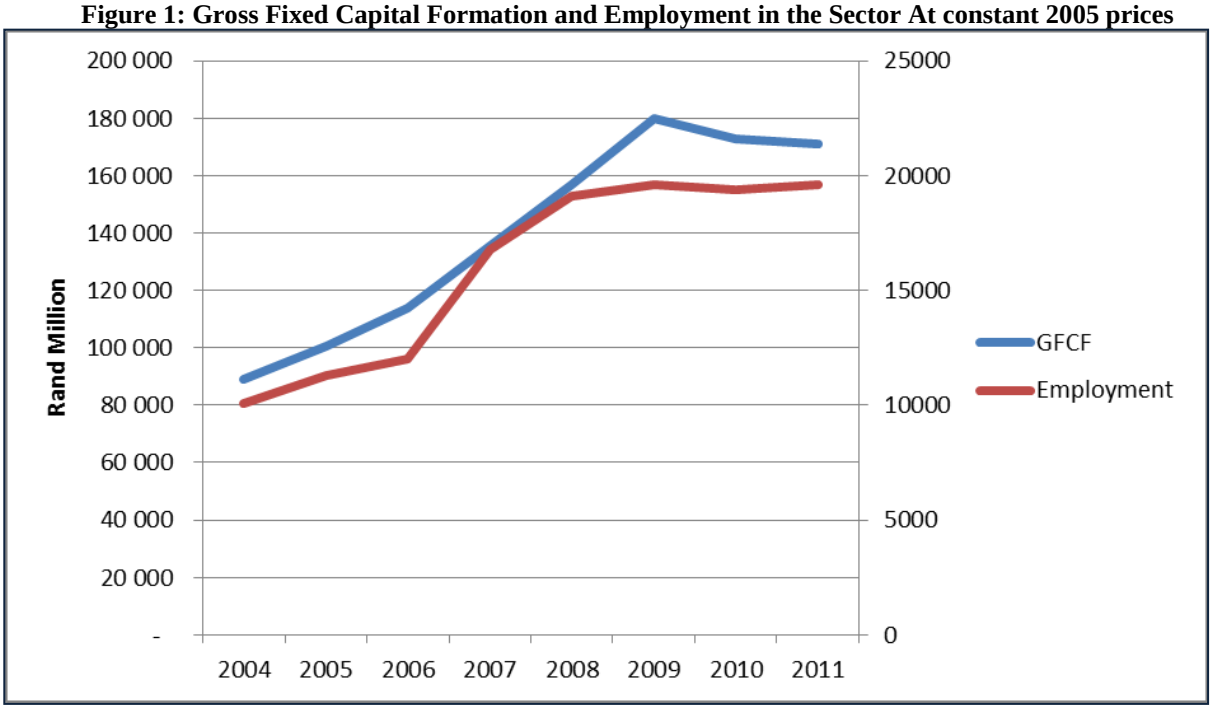
The expertise available in the civil engineering sector can be used to assess how projects above an agreed threshold (value and sector) can stimulate local production through maximizing local procurement and determining the opportunities for import replacement. Furthermore, the civil engineering sector recognises that the lack of engineering skills in the public sector can undermine the effective rollout of the infrastructure programme. In view of this, the civil engineering sector can work together with government to ensure skills transfer and, where feasible, the secondment of skills.

1. Introduction

Consulting engineering is a professional service that provides independent expertise in engineering, science and related areas to governments, industries, developers and construction firms. Most consulting engineering services are offered through consulting engineering companies, but are also frequently offered by sole practitioners. Consulting engineering companies can range in size from a partnership of two people to multinational corporations with tens of thousands of employees in offices world-wide. The importance of consulting engineering firms is that they are responsible for designing and building South Africa's infrastructure which is vital to the country's social, economic and environmental quality of life. Within a consulting engineering firm, projects are usually carried out by teams that are comprised of a variety of professions and disciplines in addition to engineers and technologists, but the team leader is usually a professional engineer. Large firms may be able to assemble the entire team from within their ranks, whereas smaller firms may need to partner with other firms to assemble the team. (Source: http://www.engineeringlegacies.com/WhatIs.php)

Internationally there is a close correlation between earnings in the consulting engineering profession and total investment in construction works. This goes further to a correlation between Gross Fixed Capital Formation (GFCF) and employment. In South Africa there is a correlation of 0.9788 between gross fixed capital formation (residential, non-residential and building) and employment in the civil engineering sector, as indicated in Figure 1. Roughly stated this means that for every percentage spend on GFCF, there is a corresponding 1% increase in employment in the sector. Given government's 20-year infrastructure development programme which has an estimated cost of around R3,2 trillion over the next 15 years, the consulting engineering sector would benefit directly both in terms of fees and employment.

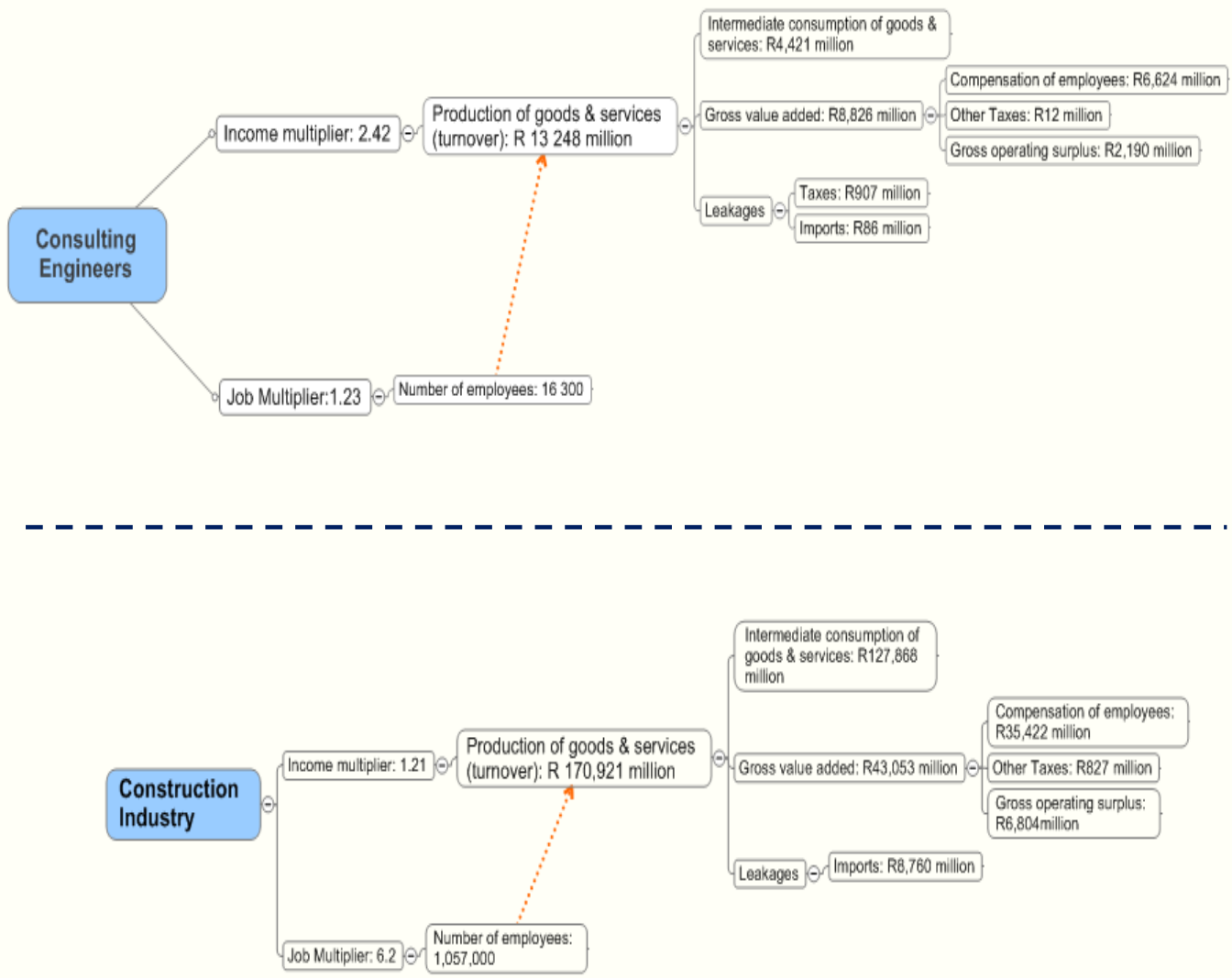
Figure 1: Gross Fixed Capital Formation and Employment in the Sector At constant 2005 prices



(Source: South African Reserve Bank Quarterly Bulletin, September 2012)

Moreover, investment in the consulting engineering sector is of major significance to the planned infrastructure development rollout in South Africa and regionally. Every additional R1 million spent on the consulting engineering sector equates to an additional spend of R8,3 million and the creation of 51.53 jobs in the construction industry, as shown in Figure 2.

Figure 2: Summary of the Multiplier Effect of Investment in the Consulting Engineering Sector



(Source: Own Calculations Based on Data from Statistics SA in Report 04-04-01 (2005), Questionnaire to Major Firms in the Sector, CESA Bi-annual Economic & Capacity Survey, Gross Fixed Capital Formation data published by the SA Reserve Bank, and Quarterly Labour Force Survey)

Consulting Engineers South African (CESA), together with the Built Environment Professionals Export Council (BEPEC), seeks to have the Consulting Engineering Sector within the Built Environment Professional Services declared a designated sector in terms of the provisions of the Preferential Procurement Policy Framework Act. The application sets out the significance of the consulting engineering sector within the context of promoting employment creation, industrialization and empowerment. It further emphasizes the role the consulting engineering sector can play in supporting government's infrastructure development programme over the next several years.

2. Alignment to Policy Objectives

Economic policy in South Africa has been progressively elaborated over the last several years in an effort to shift the country's growth path from one of low growth with limited employment expansion to one of high growth enabling inclusive participation in the economy. These policy developments aim to restructure the South African economy and transition it from its heavy dependence on resource-based economic activity to labour-absorbing activities along the agricultural value-chain, light manufacturing and services in the medium term and in the long term, to knowledge and advanced industries.[2]

The analysis of economic policy and strategy developments reveal a number of major themes. These themes include increased public investment in infrastructure, greater focus on re-industrialization through the adoption of specific support measures for sectors with growth potential, and more effective regulation of economic activity in line with the development objectives of the country. Underlying these themes is a focus on transforming the economy by accelerating Broad-Based Black Economic Empowerment (B-BBEE), and a much greater role for the state in steering economic development in the context of a developmental state.

The Accelerated and Shared Growth Initiative – South Africa (ASGISA)[3] recognized that it is necessary to achieve a growth rate of around 5% up to the period 2014 if the social objectives of halving unemployment and poverty were to be met. The ASGISA approach identified a number of 'binding constraints' that hinder economic growth and development. These constraints include currency volatility, the efficiency of the national logistics system, the shortage of skilled labour, the high levels of concentration in the economy, the regulatory burden on SMMEs and the capacity and organisation of the state. Government proposed a number of interventions to address these constraints which included infrastructure programmes, sector investment strategies, skills and education initiatives, and a series of second economy interventions. ASGISA brought into sharp focus the possibility for using infrastructure to stimulate economic development as it sought to reap the "considerable spin-offs in terms of the generation and regeneration of domestic supply industries, small business development and empowerment."[4]

The policy stance adopted in ASGISA was further elaborated in the National Industrial Policy Framework (NIPF).[5] The NIPF sought to diversify the economy and promote increased value addition in non-traditional tradeable goods and services; intensify the industrialization process and movement towards a knowledge economy; and promote a labour-absorbing industrialization path. The NIPF deepened the sectoral focus at the microeconomic level of policy implementation. The subsequent Industrial Policy Action Plans set out the implementation plans for industrial policy.[6] One of the strategic priorities of the NIPD was to use public expenditure in a manner that provided opportunities for domestic companies as suppliers to

[2] Department of Economic Development. (2010). *The New Growth Path: The Framework*. Republic of South Africa.
[3] The Presidency. (2006). *Accelerated and Shared Growth Initiative* – South Africa. Republic of South Africa.
[4] Ibid, pg. 7.
[5] the **dti**. (2007). *A National Industrial Policy Framework*. Department of Trade and Industry. Republic of South Africa.
[6] See the **dti**. (2011) *Industrial Action Policy Plan 2011/12 – 2013/14*. Economic Sectors and Employment Cluster. Republic of South Africa. the **dti**. (2010). *Industrial Policy Action Plan (IPAP) 2012/13 – 2014/15*. Economic Sectors and Employment Cluster. Republic of South Africa. ; the **dti**. (2007). *Industrial Policy Action Plan (IPAP)*. Republic of South Africa.

public expenditure programmes and, in the long term, improve the competitiveness by modernizing economic infrastructure, especially transport infrastructure.

The New Growth Path (NGP)[7] adopted by Cabinet in 2010 called for a "new growth path founded on a restructuring of the South African economy to improve its performance in terms of labour absorption as well as the composition and the rate of growth."[8] The NGP also prioritizes sectors to support employment creation. The infrastructure sector is once again identified as a key jobs driver and it is anticipated that public investment in infrastructure in the energy, transport, water, and housing sectors could provide 250 000 jobs per annum. The NGP regards the provision of infrastructure as a means to enhance efficiency across the economy as the basis for employment creation in every industry, while at the same time advancing equity goals. According to the *National Development Plan: Vision for 2030*[9], gross fixed capital formation should reach 30% of Gross Domestic Product (GDP) to achieve a sustained impact on growth and household services.

The scope and scale of government's investment in this regard has been further elaborated with the launch of the **National Infrastructure Plan** that sets out "an integrated, aligned and coordinated 20 year infrastructure pipeline."[10] Infrastructure projects to the value of R3.2 trillion are under consideration between now and 2020 in the different economic infrastructure sectors, as indicated in Table 1. It confirms the importance of "public sector investment as a foundation for long-term growth, employment and development."[11]

Table 1: Mega-projects under Consideration, 2012 – 2020

	Project stage								
R billion	**Concept**	**Pre-feasibility**	**Feasibility**	**Financing**	**Detailed design**	**Tender**	**Cons-truction**	**Ongoing prog-rammes**	**Total**
Water	20	–	–	32	–	5	18	–	74
Transport	310	–	78	17	12	88	8	71	583
Electricity	720	268	314	–	95	103	345	101	1 945
Liquid fuels	–	–	211	–	2	–	–	–	213
Education	20	–	–	40	–	–	–	125	185
Health	–	–	50	29	–	–	–	31	110
Telecommunication	12	–	–	–	–	–	3	–	15
Human settlement	–	–	–	78	–	–	–	–	78
Total	**1 082**	**268**	**653**	**195**	**109**	**195**	**374**	**328**	**3 204**
% total expenditure	*33.8%*	*8.4%*	*20.4%*	*6.1%*	*3.4%*	*6.1%*	*11.7%*	*10.2%*	*100.0%*

(Source: National Treasury, 2012)

[7] Department of Economic Development. (2010). *The New Growth Path: The Framework*. Republic of South Africa.
[8] Ibid., Pg.1.
[9] National Planning Commission. (2011). National Development Plan: Vision for 2030. Available: http://www.npconline.co.za/MediaLib/Downloads/Downloads/NDP%202030%20-%20Our%20future%20-%20make%20it%20work.pdf. [Accessed: 20 October 2012].
[10] Honourable President Jacob Zuma. (2012). *Address by President Jacob Zuma to the Presidential Infrastructure Investment Conference.* 19 October 2012, Sandton Convention Centre, Johannesburg. Available: http://www.thepresidency.gov.za/pebble.asp?relid=7034 [Accessed: 22 October 2012].
[11] National Treasury. (2012). *Budget Review 2012*. Republic of South Africa, pg. 3. Available: http://www.treasury.gov.za/documents/national%20budget/2012/review/FullReview.pdf. [Accessed: 10 October 2012].

Within the National Infrastructure Plan, 18 Strategic Integrated Projects (SIPs) have been identified and developed which bring together 150 of the smaller, individual infrastructure projects into a coherent whole. The 18 SIPs cover social and economic infrastructure in all nine provinces. According to the National Infrastructure Plan[12], SIPs cover catalytic projects that can fasttrack development and growth. Work is being aligned with key cross-cutting areas: human settlement planning and skills development. The SIPs comprise:

- 5 Geographically-focussed SIPs
- 3 Spatial SIPs
- 3 Energy SIPs
- 3 Social Infrastructure SIPs
- 2 Knowledge SIPs
- 1 Regional Integration SIP
- 1 Water and Sanitation SIP

Civil engineers design and build infrastructure and as such, within all 18 SIPs, civil engineering is a critical cross-cutting service that talks directly to the improvements in performance on infrastructure projects identified for SIPs projects. Identified improvements include[13]:

- Plan and build projects that promote low life-cycle costs
- Standardised designs and delivery
- New compact with private sector

Furthermore, an amount of R844.5 billion has been budgeted in the **Medium Term Expenditure Framework (MTEF)** for social and economic infrastructure projects, as indicated in Table 2. A large chunk of the R300bn allocated towards energy will be spent on machinery and equipment and Transnet's budget will also be used to purchase rolling stock.

Table 2: Public-Sector Infrastructure Expenditure and Estimates by Sector, 2010/11 – 2014/15

R billion	2010/11 Budget	2010/11 Actual	2011/12	2012/13	2013/14	2014/15	MTEF Total	Percentage of total
Economic services	**218.0**	**147.1**	**184.0**	**211.7**	**228.3**	**237.1**	**677.1**	**80.2%**
Energy	102.8	52.2	73.1	91.7	100.2	104.3	296.2	35.1%
Water and sanitation	21.0	14.9	22.0	25.5	24.7	25.0	75.2	8.9%
Transport and logistics	80.5	68.6	75.3	81.2	88.6	92.3	262.0	31.0%
Other economic services	13.7	11.3	13.6	13.3	14.8	15.5	43.6	5.2%
Social services	**36.9**	**25.6**	**34.9**	**38.5**	**48.4**	**53.1**	**140.2**	**16.6%**
Health	8.5	6.7	7.7	8.1	13.1	14.8	36.0	4.3%
Education	6.8	6.1	8.1	10.9	14.5	15.3	40.7	4.8%
Community facilities	16.7	11.6	17.5	17.7	18.9	21.0	57.6	6.8%

[12] A Summary of the South African National Infrastructure Plan. Presidential Infrastructure Coordinating Commission
[13] Ibid

R billion	2010/11 Budget	2010/11 Actual	2011/12	2012/13	2013/14	2014/15	MTEF Total	Percentage of total
Other social services[2]	4.9	1.1	1.7	1.9	1.9	2.0	5.9	0.7%
Justice and protection services	**3.1**	**3.0**	**3.2**	**3.4**	**3.5**	**3.7**	**10.6**	**1.3%**
Central government and administrative services	**2.0**	**1.7**	**3.8**	**7.9**	**3.5**	**2.8**	**14.2**	**1.7%**
Financial services	**0.1**	**0.3**	**0.7**	**0.7**	**0.7**	**0.9**	**2.4**	**0.3%**
Total	**260.1**	**177.8**	**226.7**	**262.2**	**284.5**	**297.6**	**844.5**	**100.0%**
% of GDP	*9.4%*	*6.5%*	*7.6%*	*7.9%*	*7.9%*	*7.4%*		

(Source: National Treasury, 2012)

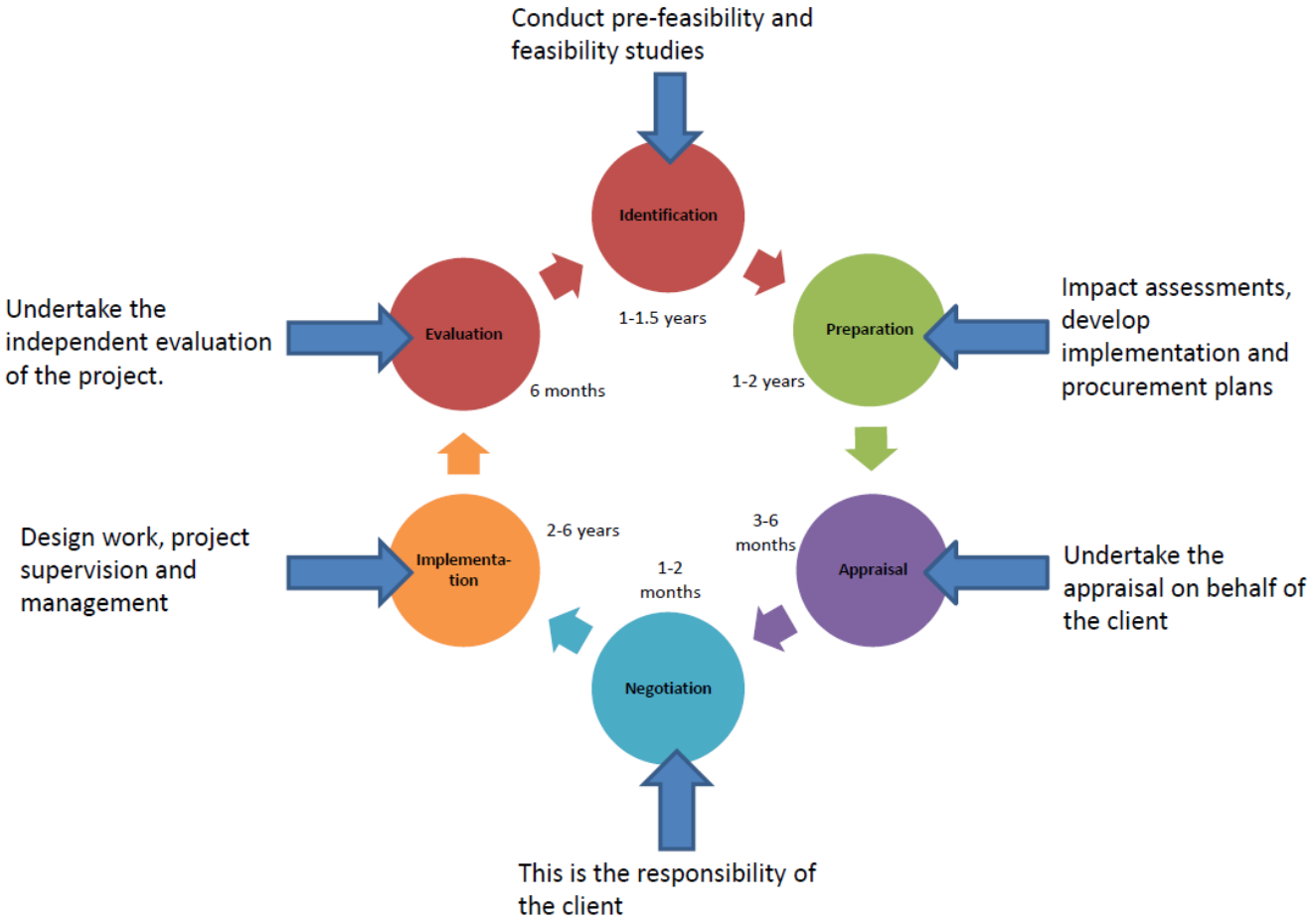
Ensuring that these investments achieve the desired job creation impact will require effective delivery that involves "long-term planning, detailed analysis" and "steps to strengthen planning and implementation capacity at all levels."[14] Furthermore, "project preparation that ignores asset life cycle and longer-term strategies (e.g. localization of input production) undermines sustainability and industrialization."[15] The consulting engineering sector plays a crucial role in the effective delivery of projects as the interface between the planning exercise that broadly incorporates decisions on the selection of projects, economic assessments, appropriate design and technology and the implementation of projects. Consulting engineering has become integral to competitiveness and delivering value-added in the way that it brings together technical possibilities, market requirements and opportunities.

Infrastructure project typically moves through various project stages within a project lifecycle as indicated in Figure 3. As is illustrated, the project cycle includes six stages: Identification, Preparation, Appraisal, Negotiation/Approval, Implementation, and Evaluation. A project in one of the first three stages is referred to as being in the "Pipeline".

[14] Ibid. Pg., 91.

[15] The Presidency and Development Bank of Southern Africa. (2012). *The State of South Africa's Economic Infrastructure: Opportunities and challenges 2012*. Development Planning Division, Development Bank of Southern Africa. Pg. 103. Available: http://www.info.gov.za/view/DownloadFileAction?id=174619. [Accessed: 18 October 2012].

Figure 3: The Project Cycle and the Role of the Consulting Engineer



(Source: Adapted from World Bank Project Cycle)

According to Table 1, the National Infrastructure Plan includes infrastructure projects to the value of R3.2 trillion under consideration between now and 2020 in various sectors. If one looks at the impact of this expenditure for consulting engineers it amounts in total to R1.04 trillion broken down across the various project phases as outlined in Table 3.

Furthermore, It is estimated by Industry Insight that the construction impact of the R844.5 billion budgeted in the Medium Term Expenditure Framework (MTEF) for social and economic infrastructure projects as indicated in Table 2, will be 40% or R320bn. If one works on the generally accepted industry figure that 10% of project cost is spent on consulting engineering skills, this amount to an impact of R32 billion for the consulting engineering sector.

Table 3: Impact of the National Infrastructure Plan on the Consulting Engineering Sector

R billion	Total budget allocation	Allocation to consulting engineers
Concept	1,082	108.2
Pre-feasibility	268	241.2
Feasibility	653	587.7
Financing	195	-
Detailed design	109	98.1
Tender	195	4
Construction	374	-
Ongoing	328	7
Total	**3,204**	**1,046**

(Source: Own Calculations based on Public Infrastructure Estimates published by National Treasury, 2012)

2.1. Significance of the Consulting Engineering Sector in the Rollout of the Infrastructure Plan

Consulting engineering activities are important for the conception and execution of social and economic infrastructure projects. The cost of consulting engineering services along the project cycle, and especially during the conceptualization, pre-feasibility, feasibility and detailed design stages of infrastructure project implementation, typically represent a small portion of the overall project cost, but the decisions taken during these stages set the ground for later decisions in the construction, operation and maintenance of the infrastructure. This is very succinctly outlined and explained in the National Infrastructure Strategy as shown in Box 1.

Operations and maintenance costs account for about 15% to 20% of the cost of a construction project but the maintenance of infrastructure is critical to the sustainability of the investments made. Speaking recently at a seminar at the Development Bank of Southern Africa[16], Mr Sibulele Dyodo, Roads and Transport Planning Specialist at the South African Local Government Association, commented at a municipal level, the greatest challenge currently faced was that of maintenance. At the same seminar, JP Labuschagne, Associate Director at Deloitte indicated that South Africa currently had a short term focus of “let’s build, but then we walk away”. He said that there had to be a link between the funding of the construction and the subsequent maintenance of the asset. The use of South African services in the design of projects and the specification of domestic inputs in construction will ensure that the overall costs of projects are reduced across the lifespan of the asset and that issues of maintenance can be dealt with at a local level. It will also ensure that infrastructure is designed to suit local conditions and ongoing municipal budgets.

Thus, consulting engineering services can favourably influence the social outcomes of infrastructure projects by taking into consideration the employment, industrialization, and empowerment effects of decisions taken during the early stages of the project life cycle. The

[16] Maintenance greatest municipal-level infrastructure challenge. Engineering News, May 15, 2014

significance of consulting engineering for job creation, industrialization, innovation and empowerment in South Africa is briefly highlighted in this section.

Box 1: Extract from the National Infrastructure Maintenance Strategy[17]:

Infrastructure life-cycle investment

The cost of maintenance of an infrastructure asset is very much determined not just by the size, nature, capacity etc of that infrastructure, but by how well it was designed, materials specified and used, the quality of construction, etc. Generally, at least half of the lifetime cost of an infrastructure asset must be borne after it has been commissioned. In other words, the cost of planning, design and construction of the asset is invariably less than half, sometimes even less than 20%, of the lifetime cost. Decisions are nevertheless frequently taken in order to "save cost" at planning, design or construction stage, despite it often being possible to show that these increase costs of operation, through the life of that asset, that far exceed the initial "saving". It might for example be that the choice of less durable construction materials is the direct cause, later, of having to prematurely refurbish or even replace the infrastructure. Or savings on the robustness of foundations later manifest themselves in damage to the infrastructure that has been placed on those foundations.

Similarly, injudicious design, or poor construction workmanship, if not detected and timeously corrected, will lead to operational problems with resultant significant costs. Furthermore, design and construction that does not take into account practical operation and particularly maintenance issues may result in costly errors. For example, special care needs to be given in the design to those elements of infrastructure that will need to be accessed in order to be repaired or serviced. The more difficult those elements will be to access, the more care must be given to choice of construction material and robustness of design, so as to reduce the frequency of access, and to reduce the probability that the elements will malfunction and have to be accessed.

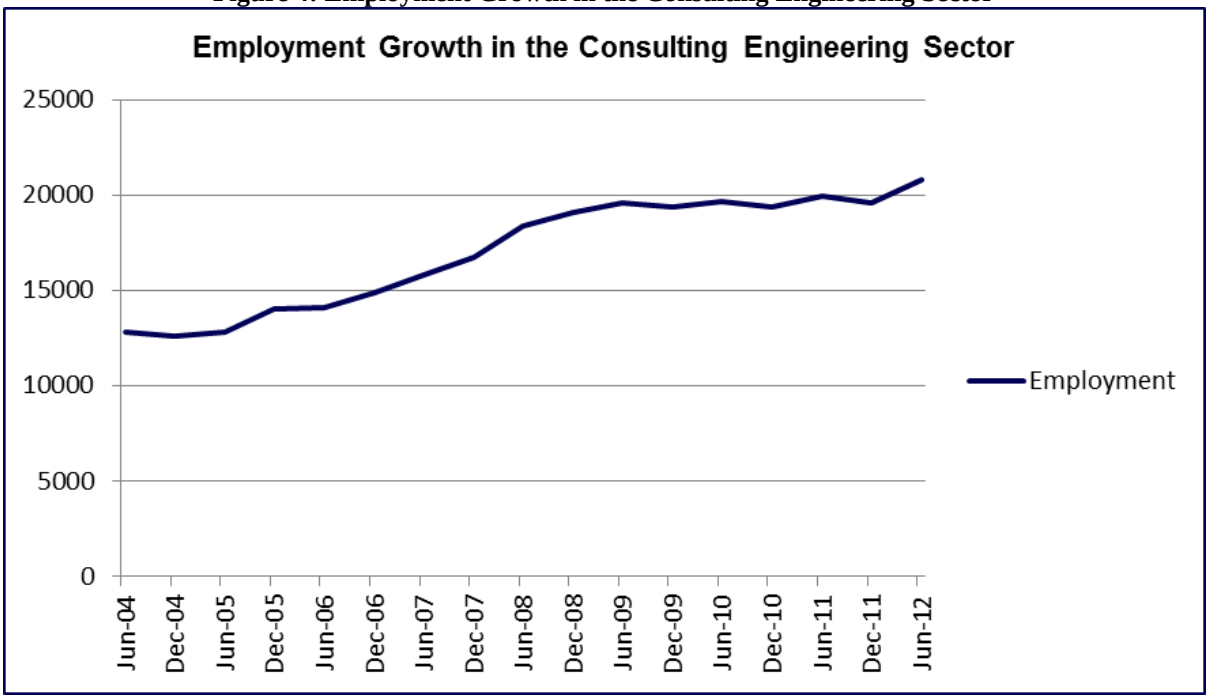
To conclude: ***The decision to procure infrastructure must be guided by understanding of the life-cycle costs of that infrastructure. It must take into account not just the relatively brief design and construction period, but the far longer period of operation, and the far greater costs of operation. It must understand that "cheap" design and construction will almost inevitably mean expensive (or unreliable) operation and maintenance.*** It must also understand that poor workmanship will have the same effect. Life-cycle asset management means considering options and strategies, and costs, throughout the life of the asset, from planning to disposal. The objective should to be to look for lowest long-term cost (rather than short-term savings) when making decisions.

[17] National Infrastructure Maintenance Strategy. July 2007. Department of Public Works, CSIR and CIDB

2.1.1. Job Creation

The consulting engineering sector consists of about 600 firms in South Africa. Over 480 of these companies are members of CESA and jointly they employ excess of 20 000 staff. Since June 2004 employment in the sector has grown by more than 8,000 jobs to 20,797 in June 2012, as indicated in Figure 4. This is an increase of more than 70% between 2004 and 2012. The growth in employment in the sector corresponded with the increase in public sector investment. As indicated previously, in South Africa there is a correlation of 0.9788 between gross fixed capital formation (residential, non-residential and building) and employment in the civil engineering sector so when the GFCF increased to 25% driven by infrastructure development in preparation for the World Cup in 2010, employment increased accordingly.

Figure 4: Employment Growth in the Consulting Engineering Sector



(Source: CESA Bi-annual Economic and Capacity Survey, June 2004 – June 2012)

The choice of construction method and technologies employed in the project execution process has a significant influence on employment in infrastructure projects. Identifying opportunities for embracing labour-intensive methods and labour-based technologies in the conceptualization and design of projects can facilitate employment growth. Notwithstanding the challenges and complexities involved in the deployment of labour-intensive methods and labour-based technologies unskilled and low-skilled workers stand to benefit the most from the adoption of such an approach that emphasizes the creation of work opportunities in the categories in which the greatest need for employment creation exist. Although infrastructure construction is by its nature temporary, the total volume of work created for the poorest and most marginal is a significant benefit from a 'value for money perspective' – a perspective that is increasingly adopted to assess the success of a project.[18] This is an area where the sector can really be capacitated to ensure that opportunities for employment growth are maximized.

[18] Construction Industry Development Board. (2005). *Labour-based methods and technologies for employment-intensive construction works. A cidb guide to best practice*. Best practice guideline – Part 1. Available:

2.1.2. Industrialisation, Growth Path and IPAP Sectors

Projects that involve local civil engineers during conceptualization and design are more likely to make use of inputs produced locally when feasible. This stimulates demand for capital goods, materials, and technical services that are produced in the domestic economy. The sectors that stands to benefit directly from increased local inputs is the metal fabrication, capital equipment and transport equipment sector.

According to the IPAP 2012/13 – 2014/15, this cluster of industries "forms a component of any industrialization path and is a key driver of the manufacturing sector's competitiveness."[19] Furthermore, increased economic activity in the wood and wood products, rubber and plastic products and articles, concrete, plaster, cement, carpentry, iron and steel products and component producers will be stimulated given the impact of construction activity on these sectors, as indicated in Table 3.

A good example of this relates to the construction of the Moses Mahbida Stadium in Durban. The stadium was designed by the German company, GMP Architekten. Given that this company had no understanding of South African conditions, the design specification on the arches was for -40°C. There is no company in South Africa that could build to this specification so the arches were fabricated in Dubai and then shipped to South Africa. If the design team had been South African, the arches would never have been so unrealistically specified and the fabrication would have been done in South Africa according to South African specifications using South African inputs.

Table 4: Use of Products in the Construction Industry at Constant Prices 2005, R million

	% of turnover	2011
Building materials: Cement, clay, concrete	15.3%	26,184
Building materials: iron & steel products	14.0%	23,963
Building materials: machinery & equipment	5.5%	9,342
Building materials: Plastic	3.2%	5,549
Building materials: Timber	1.0%	1,749
Building materials:Glass	0.3%	581
Other building materials	5.0%	8,626
Finishes: paint	1.8%	3,042
Finishes: Tiling	0.4%	600
Other finishes	0.7%	1,231
Footwear	0.2%	260
Construction	2.8%	4,763
Construction services	3.6%	6,141
Office consumables (refreshements; cleaning materials etc)	0.0%	85
Paper	0.1%	252
Printing	0.0%	41

http://www.cidb.org.za/Documents/KC/cidb_Publications/Prac_Docs/other_prac_docs/prac_docs_labour_based_methods.pdf. [Accessed: 22 October 2012].

[19] **the dti**. (2012). *Industrial Policy Action Plan (IPAP) 2012/13 – 2014/14*. Republic of South Africa. Pg. 55.

	% of turnover	2011
Fixed transport cost (leases etc)	1.1%	1,893
Running transport cost (petrol etc)	3.4%	5,751
Postage & freight	0.2%	337
Telecommunication	2.1%	3,666
Services (legal, accounting, etc)	13.2%	22,554
Furniture & equipment	0.1%	121
Pensions & healthcare	0.3%	537
Travel & Accomodation	0.4%	601
Total Intermediate consumption (a)	**74.8%**	**127,868**
Gross Value Added (output – (a))		43,053
Salaries & wages	13.1%	35,422
Taxes		827
Gross Operating Surplus	11.6%	6,804

(Source: An Aggregate of the Statistics SA Report 04-04-01 (2005), Adjusted for 2011)

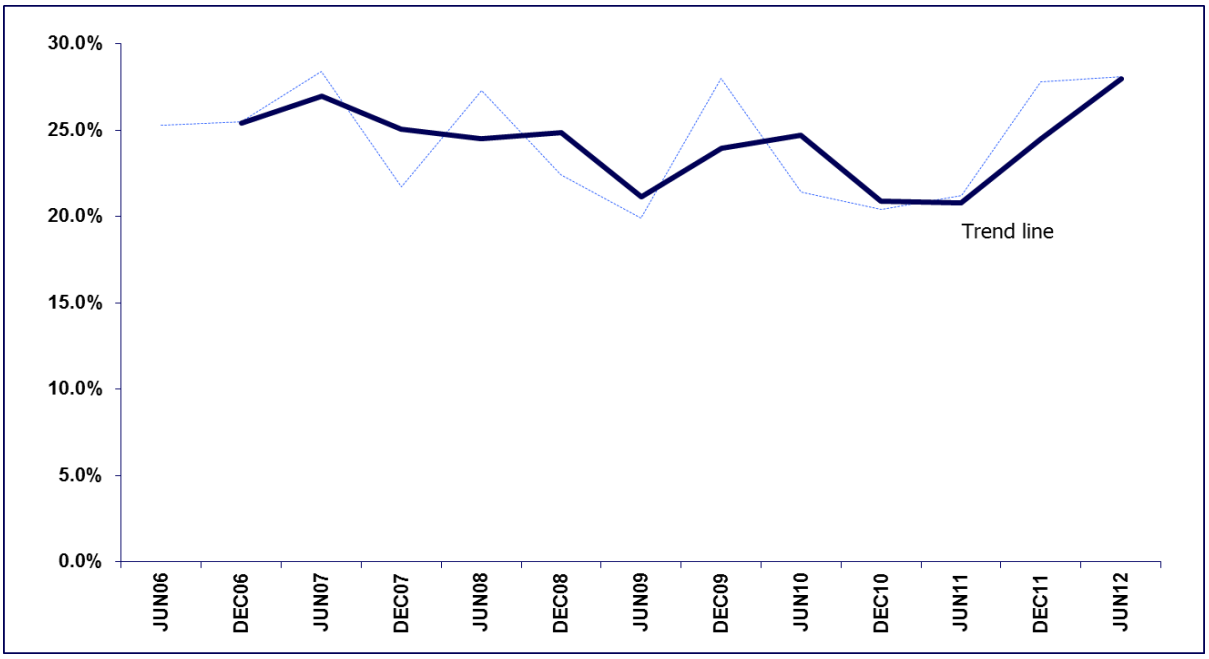
The civil engineering sector is uniquely positioned at the interface between information, knowledge and decisions on the social and economic infrastructure needs, the productive sector responsible for manufacturing capital goods in response to these needs, and supporting research and development activities. This linkage between intellectual and professional activities and the production of inputs related to the execution of complex infrastructure projects supports industrial development activity.

2.1.3. Broad-Based Black Economic Empowerment

Considerable progress has been made in addressing Broad-Based Black Economic Empowerment (BBBEE) in the sector. It is acknowledged that more needs to be done over a shorter period of time in order to transform the sector from a demographic perspective, while at the same time adhering to the world-class standards the sector is known for.

The sector continues to move closer to the target of achieving 30% economic interest held by black people and 10% held by black women. Figure 5 indicates that the black equity in the sector has increased from 25.3% in June 2006 to 28.1% in June 2012. Equity levels have remained around this level for the past few years reflecting the difficulty faced by the industry in engaging black engineers. There are simply insufficient black engineers to meet demand.

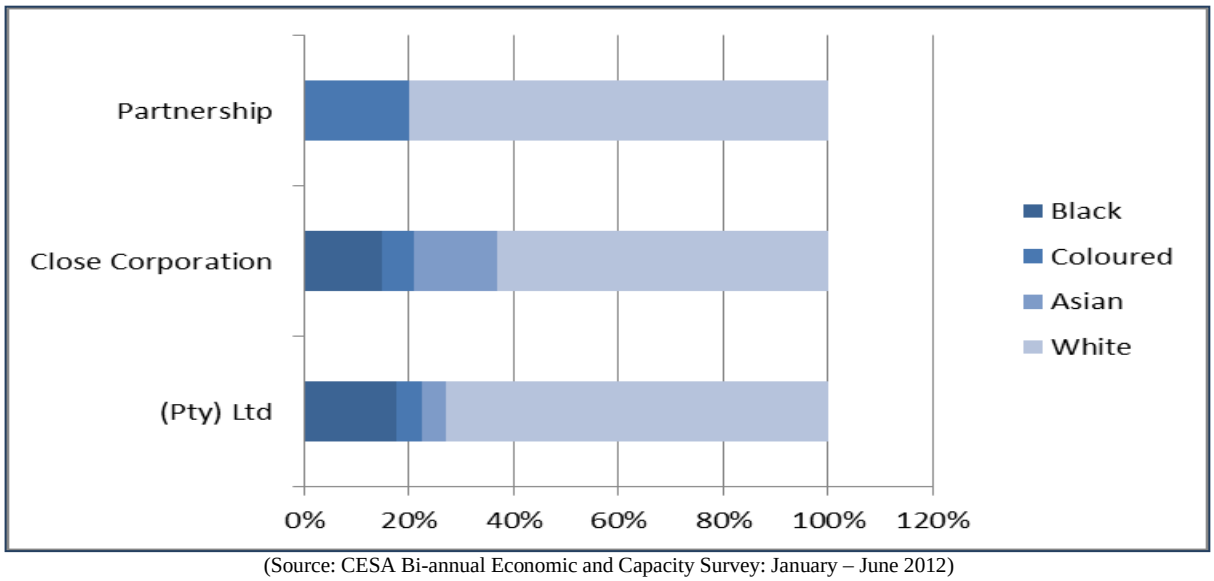
Figure 5: Black Equity as a % of Total Equity



(Source: CESA Bi-annual Economic and Capacity Survey, June 2012)

The Consulting Engineering Sector is bound by the Construction Sector Codes of Good Practice and Scorecard. In terms of the targets for 2013, the industry has performed well achieving 27.8% equity against a target of 30%. Executive Board members who are black stand at 19.7% and non-executive board members who are black at 79.6% against and overall board target of 40%. As shown in the Figure 6, the highest equity ownership is in (Pty) Ltd companies followed by Close Corporations.

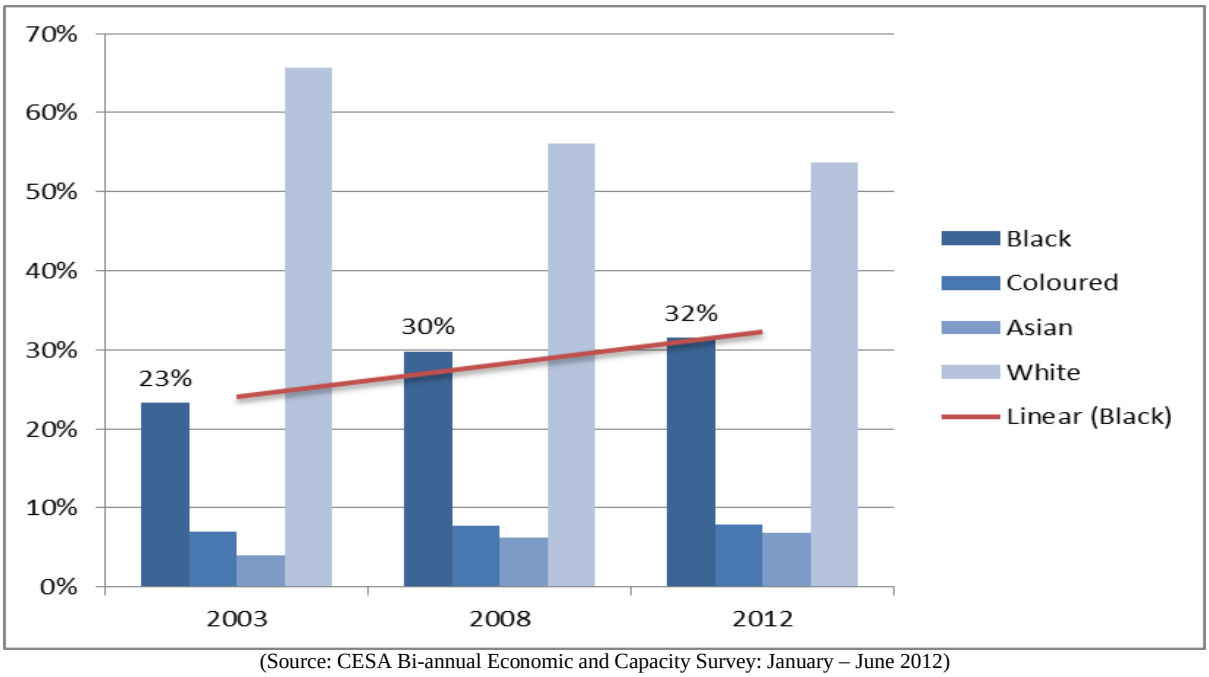
Figure 6: Ownership Profile, June 2012



(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

Figure 7 shows a positive growth in overall employment of black people in the consulting engineering sector from 23% in 2003 to the current level.

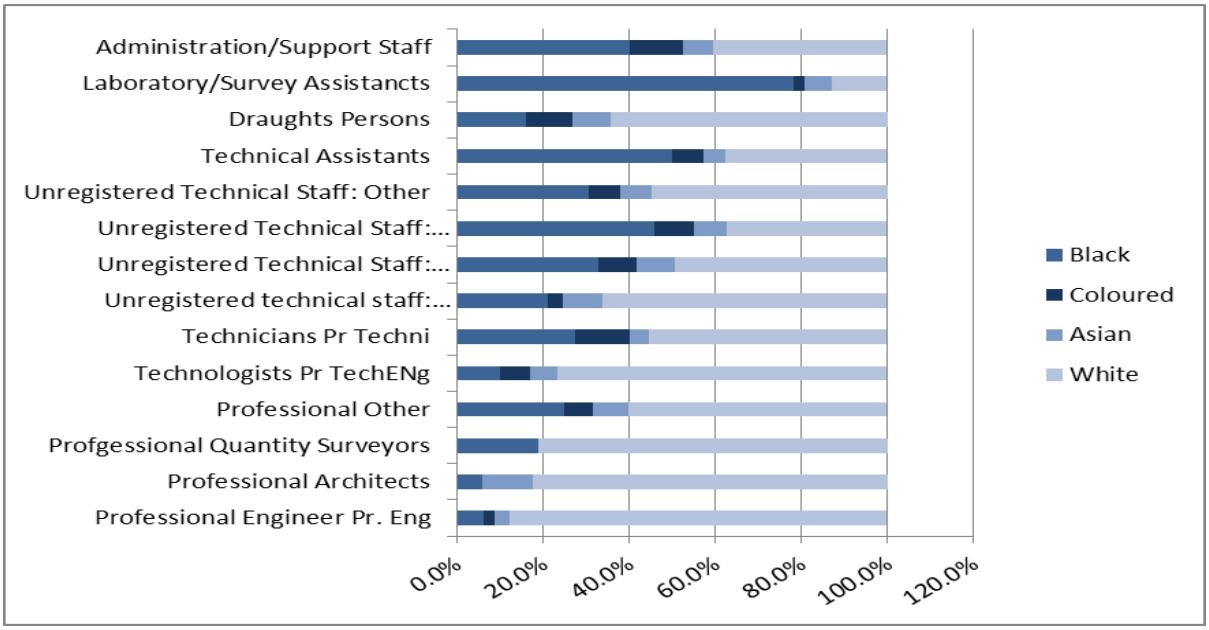
Figure 7: Employment Breakdown by Race



(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

Whilst the professional jobs remain dominated by white incumbents, the representation of black people in technical roles is over 40% in some categories, as indicated in Figure 8.

Figure 8: Employment profile of the Consulting Engineering Industry, June 2012



(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

The low levels of black professional staff within the industry reflect the fact that there are simply not enough black engineers coming through the tertiary education system. As illustrated in Table 5, in 2011/12, the Engineering Council of South Africa registered a total of 546 new engineers across all disciplines. Of this total number, 156 were black engineers.

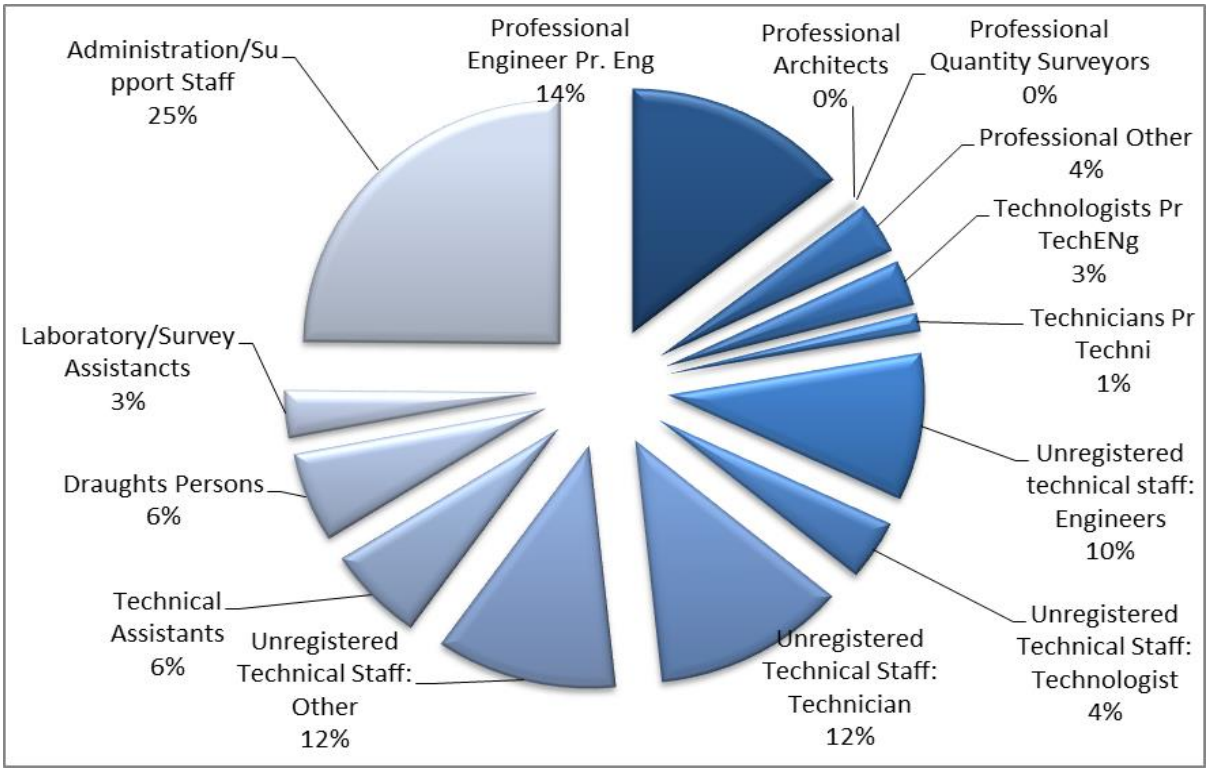
Table 5: Registration of Engineers (all disciplines), 2011/12

		Total Registrations	New Registrations
Professional Engineer		**15168**	**546**
Gender	Male	14691	482
	Female	477	64
Race	Black	1007	156
	White	13319	310
	Indian	697	64
	Coloured	145	16
Professional Engineering Technologist		**4066**	**370**
Gender	Male	3933	328
	Female	133	42
Race	Black	615	159
	White	2957	156
	Indian	348	35
	Coloured	146	20
Professional Certificated Engineers		**1066**	**29**
Gender	Male	1063	28
	Female	3	1
Race	Black	40	4
	White	977	21
	Indian	41	4
	Coloured	8	0
Professional Engineering Technician		**3844**	**340**
Gender	Male	3474	274
	Female	370	66
Race	Black	1339	251
	White	2110	60
	Indian	247	14
	Coloured	148	15

(Source: Engineering Council of South Africa Annual Report)

Figure 9 provides a breakdown of jobs by category across the consulting engineering sector. Professional jobs account for 18% of total employment and administration and support a further 22%. The bulk of jobs fall into the categories of technicians, technologists and draughts people at various levels.

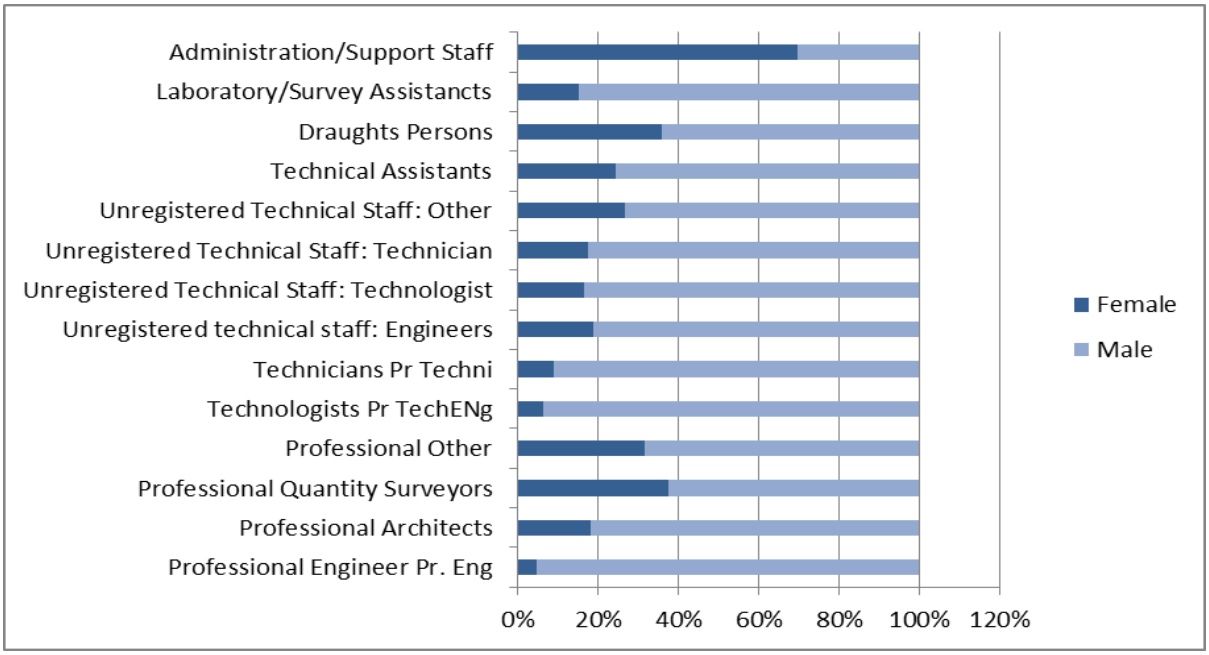
Figure 9: Employment Breakdown by Job Category



(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

The sector, just by the nature of the jobs, is dominated by males. In June 2012, women accounted for 31% of sector employment and as shown in the Figure 10, a great deal of this employment is in administrative roles.

Figure 10: Employment Breakdown by Gender

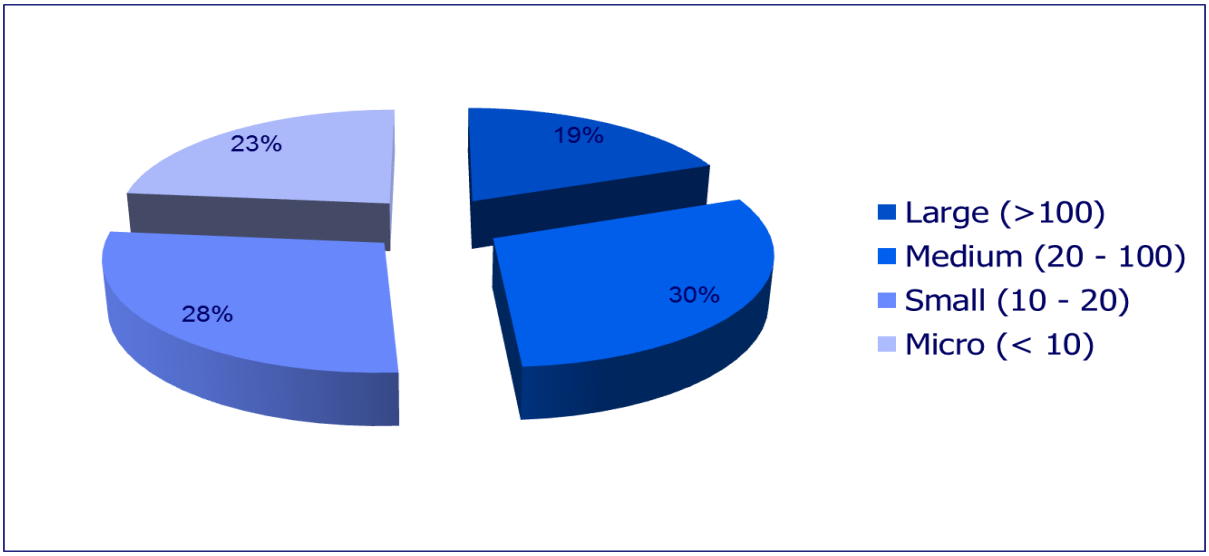


(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

2.1.4. Promotion of SMME's

The consulting engineering sector is dominated by small and medium enterprises. Figure 11 indicates that more than 50% of firms in the sector are micro and small enterprises employing up to 20 staff. Medium-size enterprises account for a third of all firms in the sector.

Figure 11: Structure of Consulting Engineering Sector by Employment



(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

Furthermore firms with a gross annual fee income of less than R1,5 million constitute 15% of enterprises, while firms with up to R11,5 million fee income account for 55% of firms. Support to the sector therefore, effectively translates into small business development given the significant role of the small and medium size enterprises in the sector. By designating civil engineering skills, foreign companies will be forced to partner with local companies and will thereby increase the skills base of these companies and allow them to grow.

2.1.5. Technological Capabilities

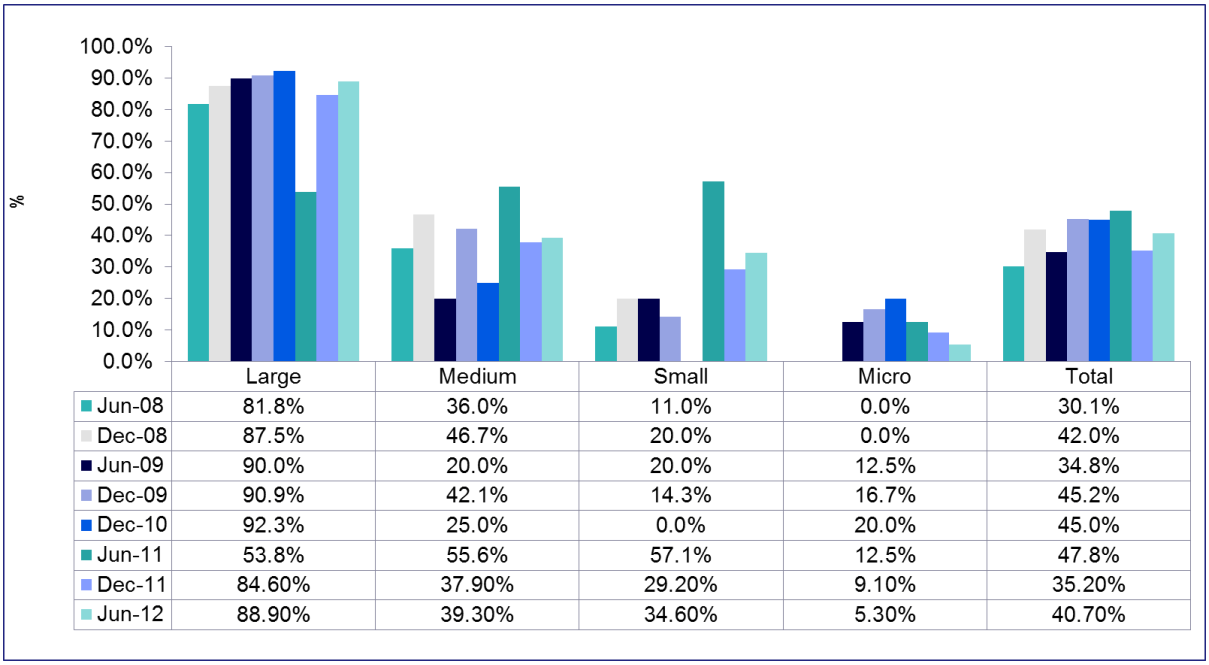
The core capabilities of consulting engineering firms is premised fundamentally on the skills, knowledge and experience involved in the application of scientific and technical knowledge in the design and construction of a project. Thus, the accumulated skills, knowledge and experience of the professionals in the firm or project groups provide the competitive advantage to firms. Consulting engineering firms typically have strong links with institutions that form part of the national system of innovation for sharing information and knowledge about professional and technical developments such as the CSIR and the CIDB. Increasingly, the application of advanced knowledge in consulting engineering firms is aided by the applications of information, communication and networking systems.

These kinds of information technologies have significantly impacted the production of designs with the assistance of computer-aided design (CAD) systems. Moreover, the digitization of data

and the use of advanced database management software have contributed to the development of new, increasingly sophisticated services. Finally, the use of communication and networking technologies have provided opportunities to link into global knowledge networks for the purposes of the technological diffusion of knowledge and to enhance project communication processes. These technological capabilities increasingly form the basis for the comparative advantage of the sector in South Africa.

The role of quality assurance systems in embedding these technological capabilities in consulting engineering firms in the country has become increasingly significant. Quality assurance mechanisms enable firms to provide highest quality solutions to technical problems through various processes involved to exercise quality control over studies and designs. More than a third of small consulting engineering firms and nearly nine out of ten large firms are certified, as indicated in Figure 12.

Figure 12: ISO 9001:2008 Certified Firms



	Large	Medium	Small	Micro	Total
Jun-08	81.8%	36.0%	11.0%	0.0%	30.1%
Dec-08	87.5%	46.7%	20.0%	0.0%	42.0%
Jun-09	90.0%	20.0%	20.0%	12.5%	34.8%
Dec-09	90.9%	42.1%	14.3%	16.7%	45.2%
Dec-10	92.3%	25.0%	0.0%	20.0%	45.0%
Jun-11	53.8%	55.6%	57.1%	12.5%	47.8%
Dec-11	84.60%	37.90%	29.20%	9.10%	35.20%
Jun-12	88.90%	39.30%	34.60%	5.30%	40.70%

(Source: CESA Bi-annual Economic and Capacity Survey, June 2012)

In addition to benefitting South African based clients through the provision of quality infrastructure, quality assurance systems allow companies to be more competitive in the export market. A company that is ISO 9001 certified has an advantage over a company that is not. Certification further provides a level of credibility for a company operating in a foreign environment where they have no track-record.

2.1.6. Competition

The down-turn in economic activity in developed countries, particularly in Europe, has had adverse consequence for the consulting engineering sector abroad. Firms are increasingly looking to deploy their capacity in Africa to take advantage of the huge infrastructure development drive across the continent and the region. Firms from Latin America, Asia and firms from other regions are also positioning to exploit opportunities in the continent. This has further witnessed an influx of foreign engineering companies establishing themselves in South Africa as a base from which to service the southern African region.

Earlier this year, African Heads of State endorsed the implementation of the Programme for Infrastructure Development in Africa (PIDA) at the African Union Summit in February.[20] This is a multi-billion dollar infrastructure development initiative that will run through 2040. Furthermore (and closely allied to PIDA), SADC Ministers Responsible for Infrastructure met in Luanda, Angola on 28 June 2012 and endorsed the Regional Infrastructure Development Master Plan (RIDMP). The RIDMP defines SADC's infrastructure development strategy and constitutes the basis on which projects are prioritized as well as the modus operandi for implementation. The Strategic Framework contained in the RIDMP forecasts both a requirements and implementation roadmap over a duration of fifteen years. The three phases of implementation of the RIDMP are as follow: Short-term 2013-2017, Medium-term 2017-2022 and long-term 2022-2027. The plan identifies 418 priority infrastructure projects to the cost of approximately US$500 billion with transport (222 projects), energy (89 projects) and water (34 projects) taking up the major share of the funding requirements.[21]

European governments have been quick to point out the potential market and to encourage their firms to exploit opportunities in Africa. For example, the Irish Minister for Trade and Development Joe Costello launched a report which identifies up to €12 billion worth of potential business in Africa for Irish companies in September 2012. At this meeting it was the Irish Embassy network committed to "working closely with the private sector to establish Irish Business Associations which can support new entrants to the local market."[22] There are numerous other examples of foreign engineering concerns active across the region including the Irish company, Kentz, Odebrecht from Brazil, Teixeira Duarte of Portugal and KBR and Bechtel from the United States.

Recognizing the civil engineering sector as a designated sector could further strengthen the competitive advantage of domestic firms to withstand the likely increase in competition both locally and regionally. Designating the sector would further encourage foreign firms to enter the market in Africa and southern Africa through partnerships with South African-based firms and secure a portion of the RIDMP spend for South African based entities. This could potentially

[20] African Development Bank. (2012). *African leaders endorse major continental infrastructure programme*. Press release following the 18th Ordinary Session of the Summit of the African Union, 23 – 30 January 2012, Addis Ababa, Ethiopia. 01 February 2012. Available: http://www.afdb.org/en/news-and-events/article/african-leaders-endorse-major-continental-infrastructure-programme-8806/. [Accessed: 22 October 2012].
[21] Southern African Development Community. (2012). *Regional Infrastructure Development Master Plan. Executive Summary, August 2012*. Available: http://www.ridmp-gis.org/sadecdocs/English/SADC%20RIDMP%20-%20Executive%20Summary%20%28English%20-%20Aug%202012%20v1%29.pdf. [Accessed: 22 October 2012].
[22] Irish Government News Service. (2012). *Multi billion euro business potential for Irish Companies in Africa*. Press Release. 16 September 2012. Available: http://www.merrionstreet.ie/index.php/2012/09/multi-billion-euro-business-potential-for-irish-companies-in-africa/. [Accessed: 22 October 2012].

promote technology transfer, skills development and in this way strengthen the capabilities of the domestic industry.

3. Industry Profile

There are in the region of 600 consulting engineering companies in South Africa. Over 480 of these companies are members of CESA and collectively they employ 20,797 staff, who collectively earn a total fee income of almost R17 billion per annum. Overall the industry contributes around 0.5% to GDP. Given that civil engineering is the most important sub-sector of this sector, the profile and application for designation focuses specifically on this sector.

Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams, and buildings. Civil engineering takes place in the public sector from municipal through to national governments, and in the private sector from individual homeowners through to international companies. (Source: en.wikipedia.org)

This section provides an overview of the civil engineering sector with reference to the significance of public procurement to the industry, structure, multipliers and competition and pricing.

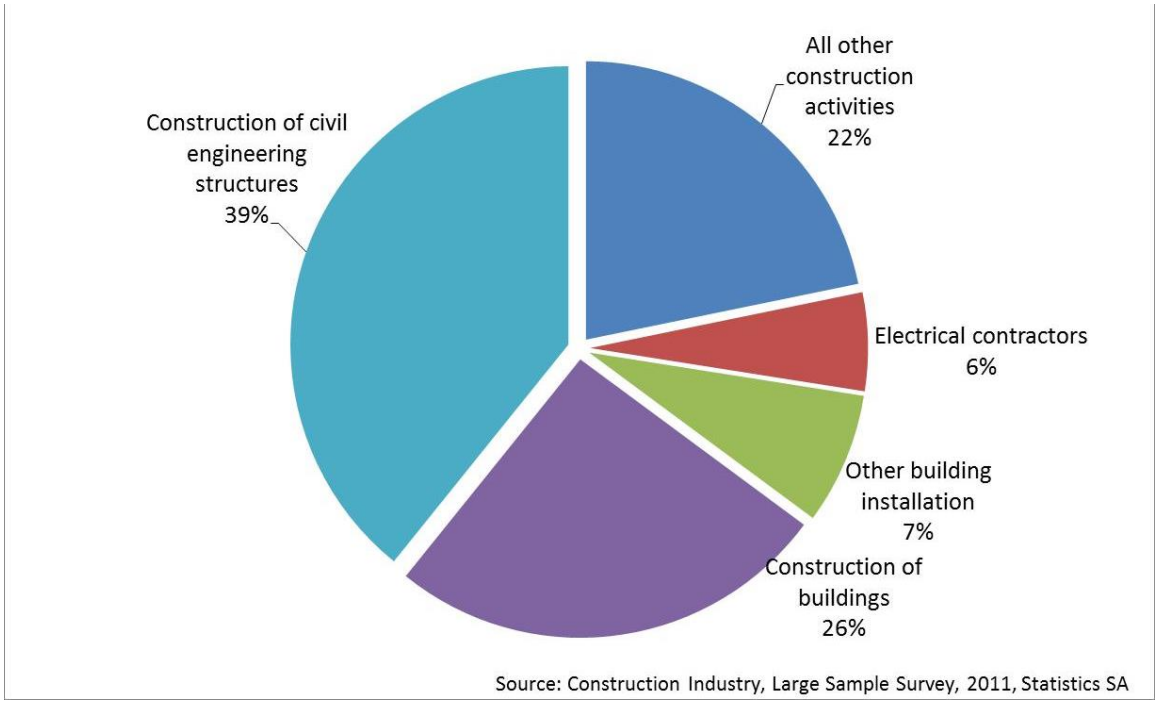
3.1. Background to the importance of the Civil Engineering sector in Construction

3.1.1 Contribution in terms of total industry turnover

According to the CESA Bi-annual Economic & Capacity report of 2011, the turnover of the civil engineering discipline comprises 35,1% of the total estimated turnover of consulting engineers. This figure is further supported by the 2011 Construction Industry Large Sample Survey, published by Statistics SA in November 2012.

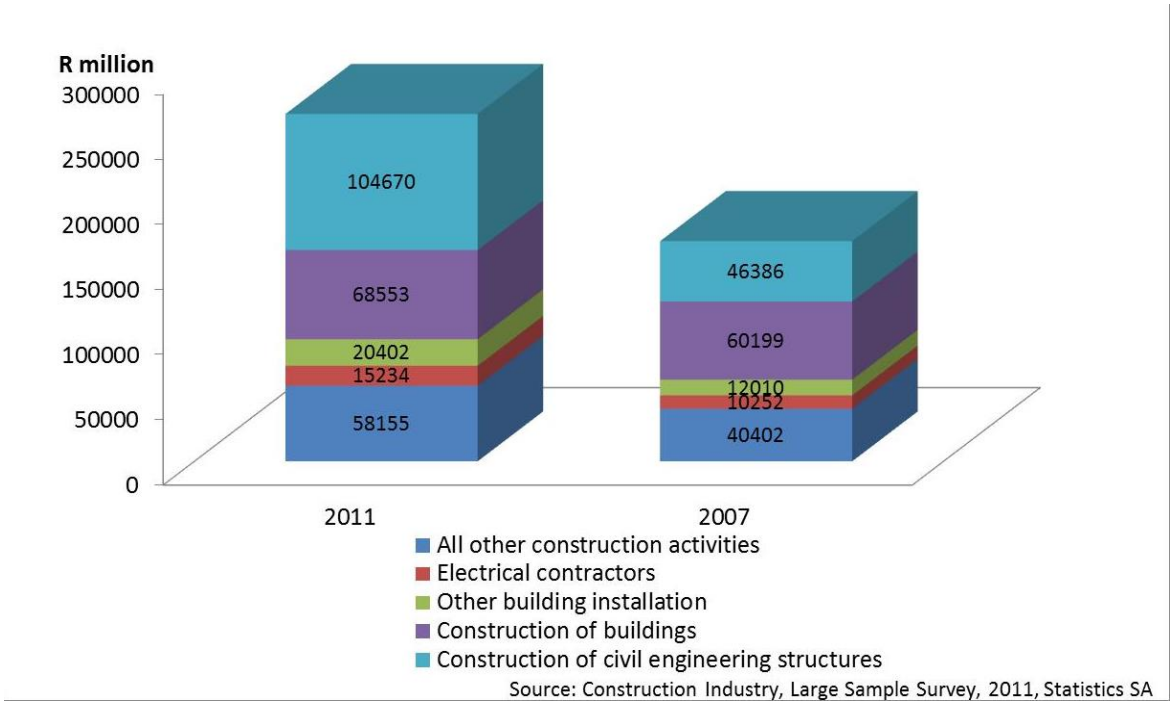
According to survey the total income for the construction industry in 2011 was R268 100 million of which R104 670 million or 39% was contributed by the construction of civil engineering structures. This proves the importance of the civil engineering sector to the national construction industry. It should however be noted that all types of building projects contain some measure of civil engineering work, for example earthworks, and additional infrastructure such as water and sanitation, although the officially published information focuses mainly on the construction of civil structures such as roads, bridges, harbours etc. This means that 39% may be slightly understated.

Figure 13: Income in the Construction Industry, 2011



There has been a significant growth (31%) in the contribution of the civil engineering industry during the past few years as part of the South African government's accelerated investment in infrastructure. This also enhances the importance of civil engineering in the economic development of the country.

Figure 14: Total Construction Turnover 2007 vs 2011



3.1.2 Contribution in terms of total employment

According to the 2011 Survey, the total number of employees in the construction industry as at the end of June 2011 was 483 651 of which 31% were employed in the construction of civil engineering structures (152 337). Further details regarding employment in the civil engineering sector will follow later in the report.

As in the case of income earned by civil engineering firms, employment has increased by 26,3% compared to a 10,5% decrease in total employment in construction.

Figure 15: Employment in the Construction Industry 2011

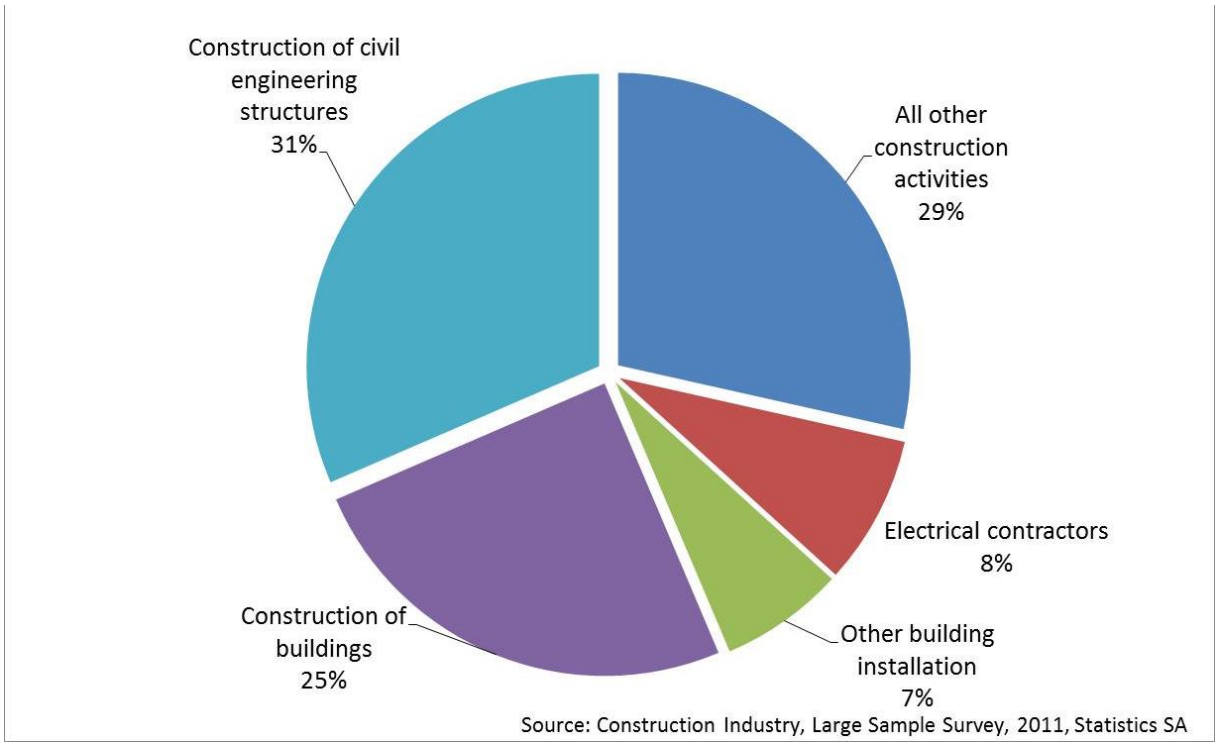
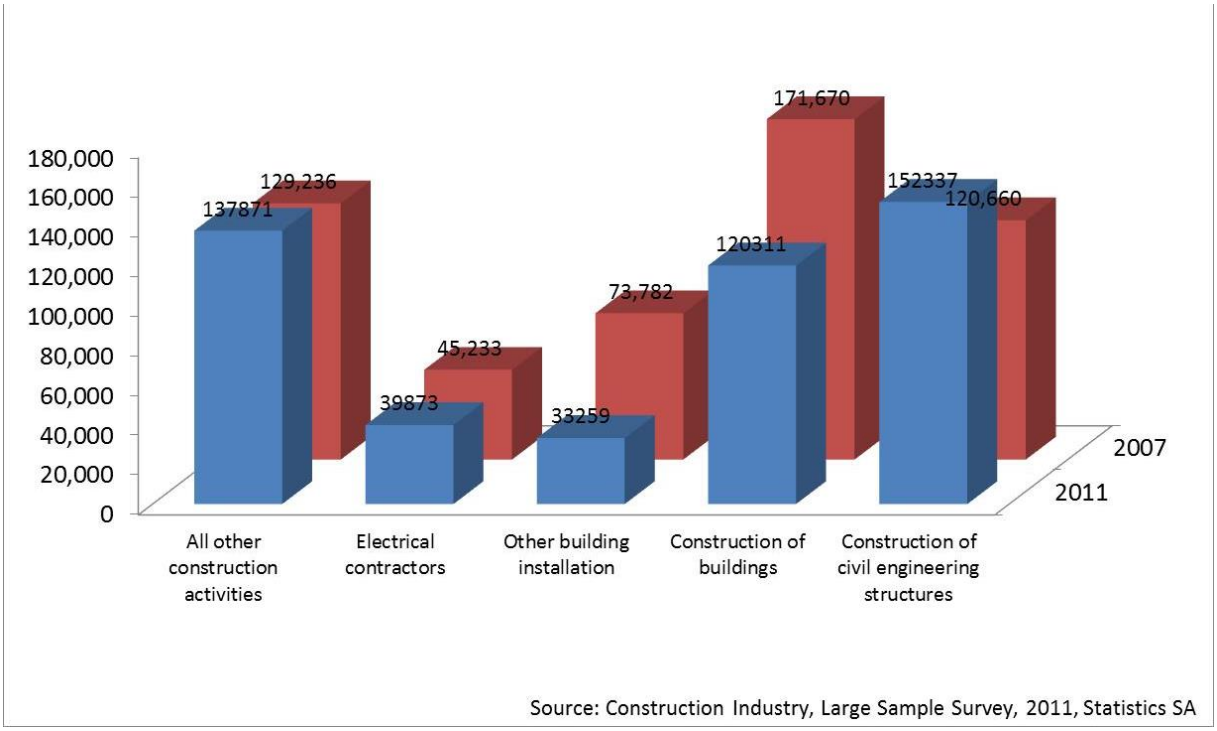


Figure 16: Employment in Construction 2007 vs 2011

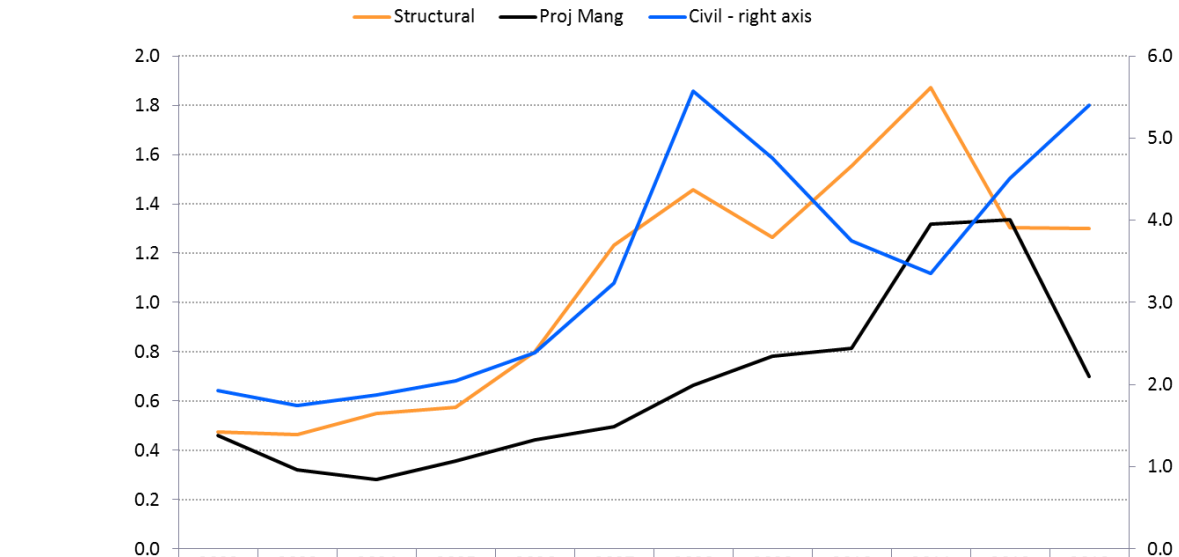


3.2. Sector Profile: Civil Engineering

3.2.1. Turnover

The civil engineering sector is the largest sub-discipline of the general consulting engineering sector. In 2013, some 50% of fee income earned by the consulting engineering sector in general was earned by civil engineers. In 2013, turnover in the civil engineering sector amounted to R5.4 billion (real 2000 prices).

Figure 17: Fee Income Earned By Top Three Disciplines: R Bn Real 2000 Prices Moving Average (2 Survey Period): 2002 – 2013



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Structural	0.5	0.5	0.6	0.6	0.8	1.2	1.5	1.3	1.6	1.9	1.3	1.3
Proj Mang	0.5	0.3	0.3	0.4	0.4	0.5	0.7	0.8	0.8	1.3	1.3	0.7
Civil - right axis	1.9	1.7	1.9	2.0	2.4	3.2	5.6	4.8	3.8	3.3	4.5	5.4

(Source: CESA Bi-Annual Economic and Capacity Report, July to December 2013)

The 2011 Census of the Construction Industry classifies the turnover of firms in the civil engineering sector into six main sources of income:

Table 6: Income in the Construction Industry, 2011 (R million)

	Sales	Services	Rental and leasing income	Interest	Profit on sale or revaluation of assets	Other	Total
Civil engineering	3 254	98 087	236	731	275	2 087	104 670
	3.1%	93.7%	0.2%	0.7%	0.3%	2.0%	
Construction total	9 239	249 139	1 143	2 479	1 339	3 675	267 014
	3.5%	93.3%	0.4%	0.9%	0.5%	1.4%	

(Construction Industry Large Sample Census, (Report 50-02-01), 2011)

For the purpose of calculating fiscal multiplier of the industry, focus is given to “Services” as the main source of income which is indicative of the economic impact of the sector.

An analysis of income by enterprise size shows the economic origin of demand for civil engineering activities. It is clear that large enterprises and more specifically the state and parastatals are a major source of demand for civil engineering services.

Table 7: Income by size of enterprise in the Construction Industry, 2011

	Large enterprises	Medium enterprises	Small and micro enterprises	Total
Civil engineering	89 852	12 381	2 437	104 670
	85.8%	11.8%	2.3%	
Construction total	171 098	57 229	38 687	267 014
	64.1%	21.4%	14.5%	

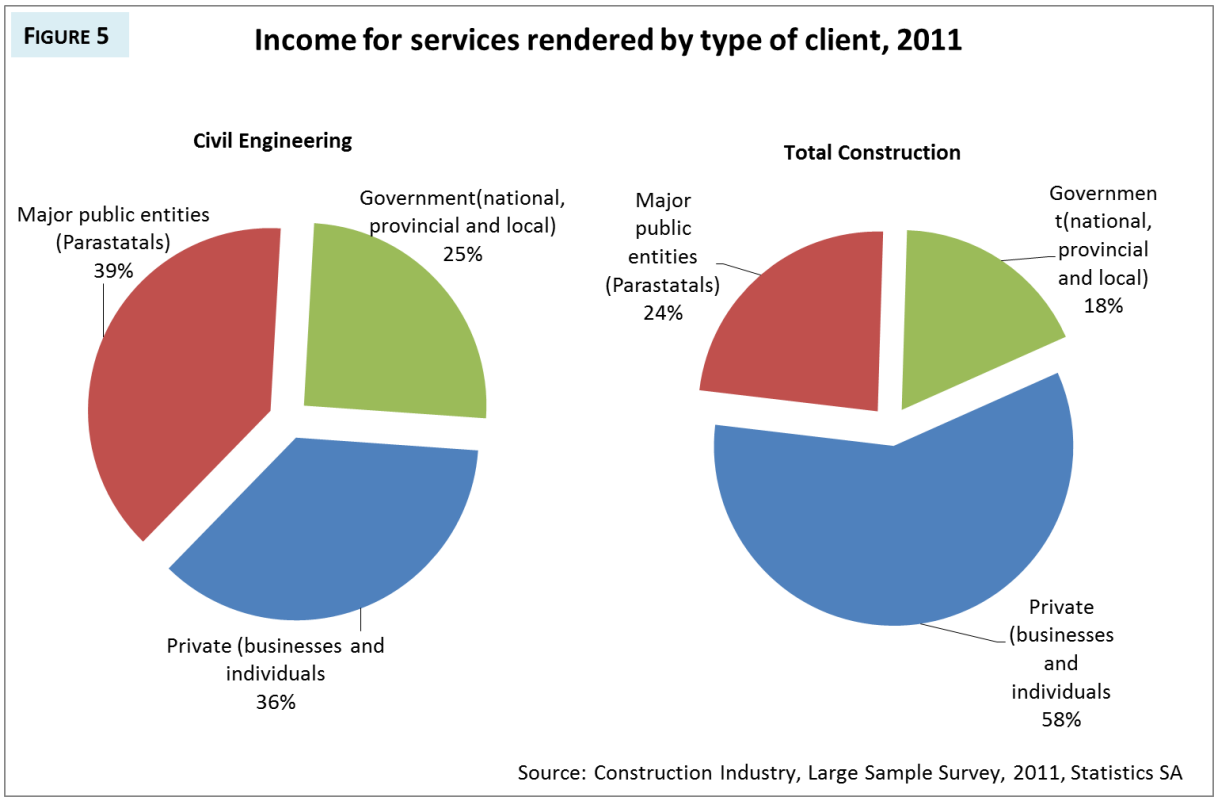
(Construction Industry Large Sample Census, (Report 50-02-01), 2011)

Note: Enterprises are divided into four size groups according to the value of their turnover as summarized below:

Size group	Turnover 2011
Large	≥R52 000 000
Medium	R12 000 000 – R52 000 000
Small	R6 000 000 –R12 000 000
Micro	≤ R6 000 000

The civil engineering industry has a higher exposure to major public entities and government expenditure compared to the national average. This is of economic significance as the industry therefore is directly aligned with government targets and policies that are earmarked for higher levels of infrastructure development that will directly impact (positively) on job creation.

Figure 18: Income for Services Rendered by Type of Client, 2011



Drawing on a survey conducted by industry insight during the Second Quarter of 2014 for the South African Forum of Civil Engineering Contractors (SAFCEC), the following tables detail work undertaken by the civils industry by project type, client and province.

Table 8: Turnover Distribution by Sub-Discipline

	Large	Medium	Small	Total 2013Q2	Total 2013Q4	Total 2014Q1
Roads	52.2%	69.8%	79.1%	39.5%	41.0%	53.8%
Earthworks	4.2%	7.5%	2.4%	9.4%	5.6%	4.5%
Water Bulk Infrastructure	6.1%	4.3%	0.4%	7.8%	8.7%	5.9%
Water and Sanitation	3.8%	4.7%	2.1%	3.7%	9.3%	3.9%
Rail	0.8%	0.0%	0.0%	1.0%	0.0%	0.7%
Harbours	0.0%	0.5%	0.0%	4.1%	0.5%	0.1%
Power (bulk)	12.5%	0.0%	0.0%	10.2%	16.9%	11.4%
Power (services)	2.7%	0.0%	0.0%	0.0%	0.0%	2.4%
Airports	1.9%	1.8%	0.0%	4.7%	0.7%	1.9%
Mining infrastructure	6.0%	4.8%	0.0%	9.3%	9.9%	5.8%
Mining (surface earthworks)	3.0%	2.9%	0.0%	5.1%	0.4%	3.0%
Other	6.8%	3.6%	16.0%	5.1%	6.9%	6.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

(Source: State of the South African Civil Industry 2014Q2, Compiled for SAFCEC by Industry Insight)

As shown in the table above, large civil contractors receive over 50% of their turnover from roads and a further 12,5% from bulk power. Small and medium contractors are more reliant on the roads sector with 69.8% and 79.1% of turnover respectively earned from this sector.

Table 9: Turnover Distribution by Client

	Large	Medium	Small	Total 2013Q2	Total 2013Q4	Total 2014Q1
Central	18.1%	0.2%	0.0%	4.3%	2.1%	16.4%
Provincial	7.5%	25.0%	26.7%	5.5%	7.3%	9.2%
Local	1.4%	43.1%	68.4%	7.5%	8.6%	5.6%
SOEs	28.8%	12.0%	0.0%	27.6%	58.3%	27.1%
Private	44.2%	19.7%	4.9%	55.1%	23.7%	41.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

(Source: State of the South African Civil Industry 2014Q2, Compiled for SAFCEC by Industry Insight)

Table 9 shows that overall, the private sector is the most important source of turnover for the civil contracting sector followed by SOEs. What is useful to note is that this is not the case across all sizes of firms with small enterprises remaining completely dependent on local and provincial government for their turnover. It is also interesting to note that it is only medium and large contractors that are working for SOEs.

Table 10: Geographic Distribution of the Value of Civil Engineering Construction Work (Turnover)

	Large	Medium	Small	Total 2013Q2	Total 2013Q4	Total 2014Q1
Gauteng	17%	18%	10%	8%	26%	17%
Western Cape	9%	55%	49%	10%	7%	13%
Eastern Cape	7%	1%	37%	5%	2%	6%
Northern Cape	7%	1%	0%	4%	10%	7%
Mpumalanga	21%	5%	1%	37%	17%	20%
Free State	8%	4%	0%	7%	6%	8%
Limpopo	11%	7%	1%	15%	12%	11%
North West	1%	4%	2%	6%	2%	2%
KwaZulu Natal	18%	6%	0%	7%	17%	17%

(Source: State of the South African Civil Industry 2014Q2, Compiled for SAFCEC by Industry Insight)

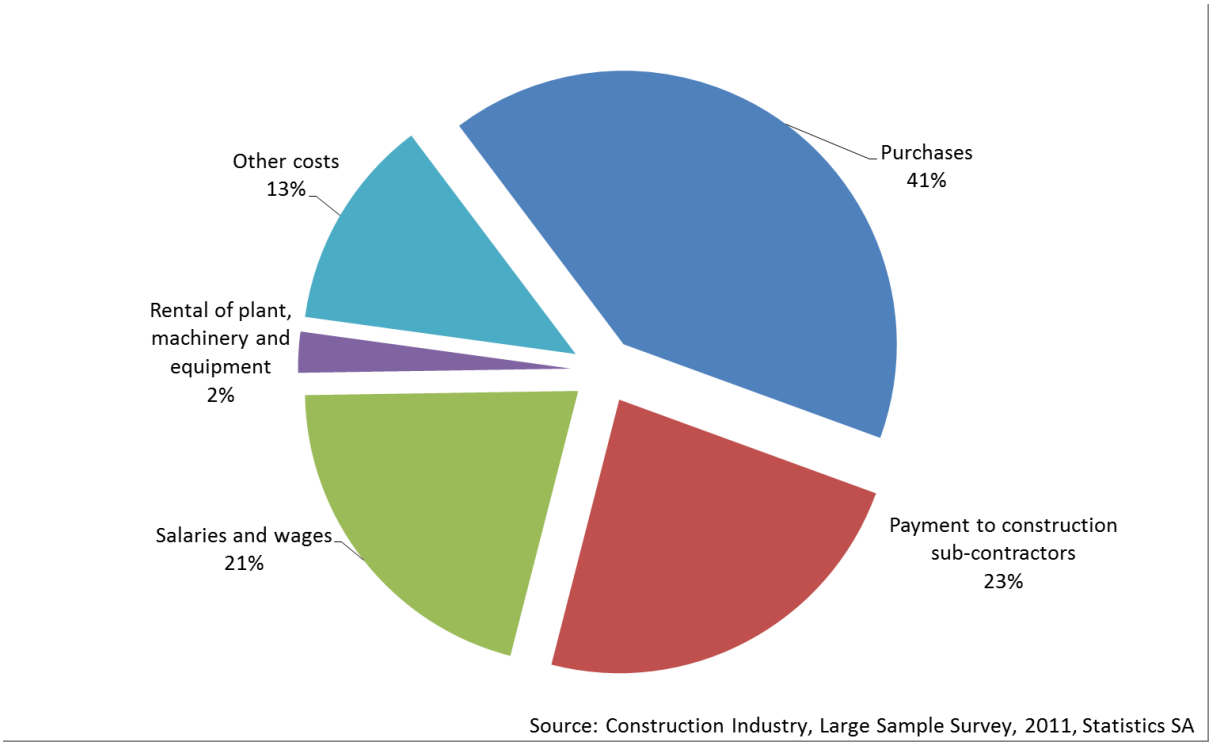
3.2.2. Expenditure

An overview of expenditure within a specific business sector, such as the civil engineering sector, provides insight of the economic impact on the surrounding business environment, and on the broader economy in general.

The three most important cost elements for civil engineering firms are the following:

- purchasing of mainly materials (41%),
- payment of sub-contractors (23%) and
- labour (21%).

Figure 19: Expenditure in the Construction Industry: Civil Engineering, 2011



Source: Construction Industry, Large Sample Survey, 2011, Statistics SA

The construction industry as a whole has a major impact on manufacturing, as shown by the large contribution to purchasing of materials. The majority of construction materials are either manufactured locally or imported. Statistics SA estimated in their input-output tables for 2011 that for every R1 invested in construction 25 cents will be generated for related manufacturing industries.

According to the Industry-by- industry input-output tables for South Africa, 2011 (Statistics SA), imports represented a mere 0,2% in value of the total output by the construction industry. Consulting Engineers in general indicated that this percentage was higher at 10% which may be a truer reflection as the majority of plant and machinery (as well as accessories for maintenance) is imported. Therefore it can be said that the construction industry's demand for materials has a significant impact on the local manufacturing industry.

Table 6 provides an overview of the various cost elements of the civil engineering segment of the South African construction industry compared to the national total.

Table 7 shows the contribution made by plant and machinery toward the civil engineering industry's capital expenditure which also shows its large dependence on the manufacturing industry, although the benefit to the local manufacturing industry may be limited as a large portion of this is believed to be imported.

Table 11: Expenditure in the civil engineering sector vs the total construction industry, 2011 (R millions current prices)

	Civil Engineering	Total Construction	% of total expenditure		% of Total Construction
			Civil Engineering	Total Construction	
Purchases	41,307	110,743	40.8%	43.2%	37.3%
Payment to construction sub-contractors	23,704	53,672	23.4%	21.0%	44.2%
Salaries and wages	20,997	48,111	20.8%	18.8%	43.6%
Depreciation	2,551	6,859	2.5%	2.7%	37.2%
Rental of plant, machinery and equipment	2,440	5,543	2.4%	2.2%	44.0%
Vehicle running cost	808	3,281	0.8%	1.3%	24.6%
Interest paid	714	2,567	0.7%	1.0%	27.8%
Repairs and maintenance	551	2,189	0.5%	0.9%	25.2%
Administration and management fees	952	1,715	0.9%	0.7%	55.5%
Losses on financial and other assets	946	1,661	0.9%	0.6%	57.0%
Rental of land, building and other structures	388	1,655	0.4%	0.6%	23.4%
Insurance	403	1,645	0.4%	0.6%	24.5%
telecommunication services	287	1,163	0.3%	0.5%	24.7%
Other	5,097	15,266	5.0%	6.0%	33.4%
Total	101,145	256,070	100.0%	100.0%	39.5%

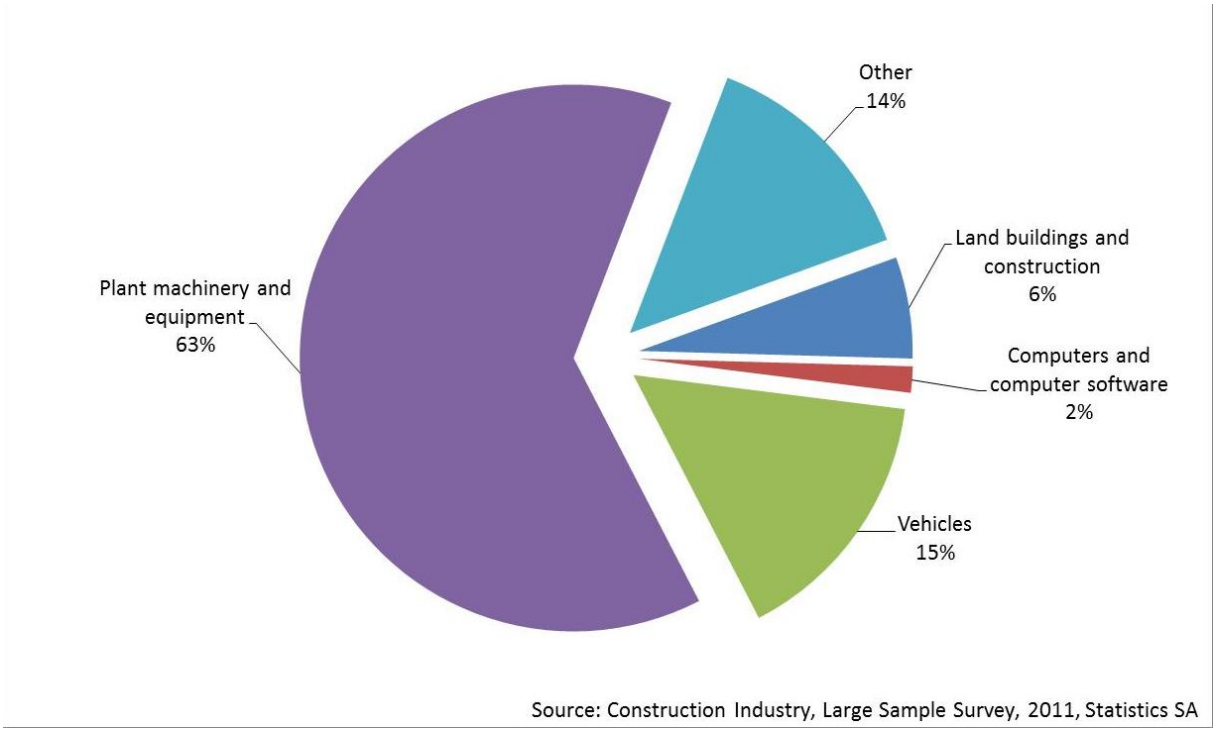
(Source: Construction Industry, Large Sample Census, Statistics South Africa, 2011)

Table 12: Capex In the Civil Engineering Sector Vs the Total Construction Industry, 2011 (R millions, current prices)

	Civil Engineering	Total Construction	% of total CAPEX		% of Total Construction
			Civil Engineering	Total Construction	
Land buildings and construction	282	791	6.0%	7.2%	35.7%
Computers and computer software	73	184	1.6%	1.7%	39.7%
Vehicles	725	3,111	15.4%	28.3%	23.3%
Plant machinery and equipment	2,980	6,047	63.4%	55.1%	49.3%
Other	641	842	13.6%	7.7%	76.1%
Total	4,701	10,975	100.0%	100.0%	42.8%

(Source: Construction Industry, Large Sample Census, Statistics South Africa, 2011)

Figure 20: Capital Expenditure in the Construction Industry: Civil Engineering, 2011



3.2.3. Employment

The civil engineering industry employed 31% of the total number of employees in the construction industry as at June 2011, according to the 2011 Large sample Survey, or 152 337 employees. This does not include those that are self-employed working in the civil engineering industry. Of the 152 337 employees, employed by the formal sector, 92% is construction workers and 2% working proprietors23. This shows the job creation ability of the civil engineering sector.

Of further significance is the fact that most of the job opportunities created by the civil engineering industry are permanent.

[23] Note: Statistics SA defines working proprietors as "*Owners, members or partners actively engaged in the work of the enterprise, excluding silent partners or inactive partners whose principal activity is outside of the enterprise*"

Figure 21: Employment by Type as at end of June 2011

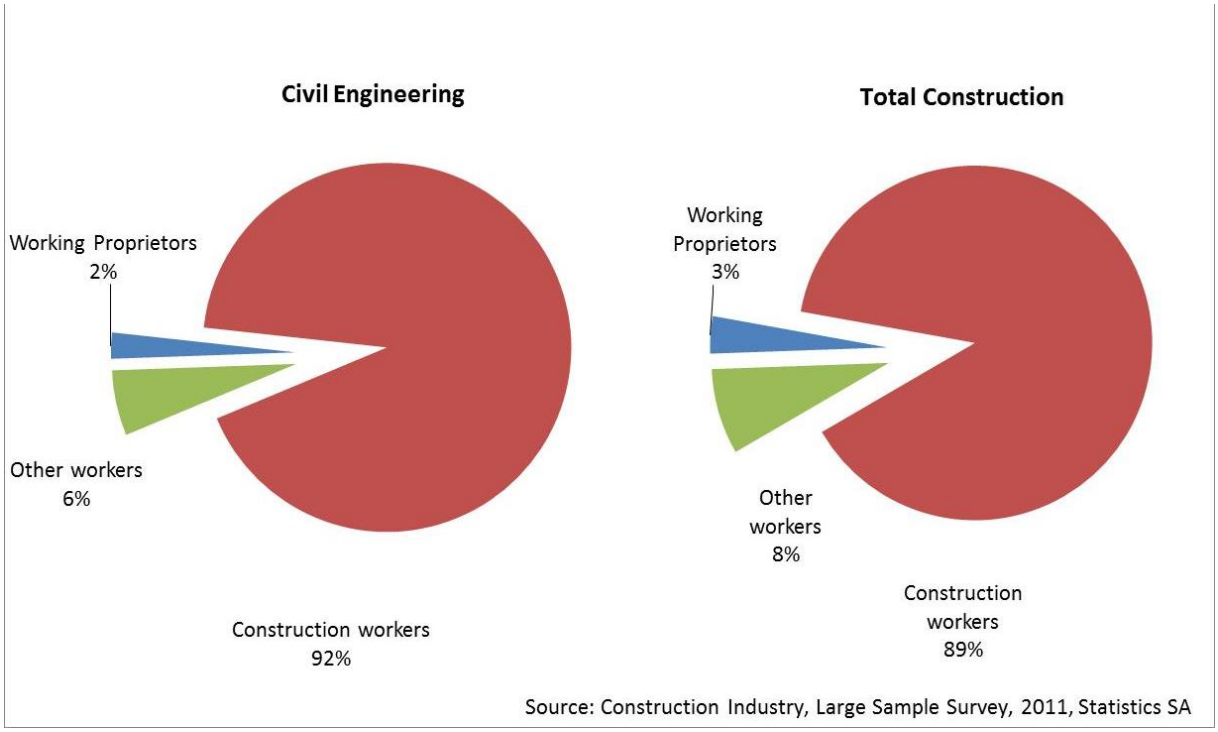
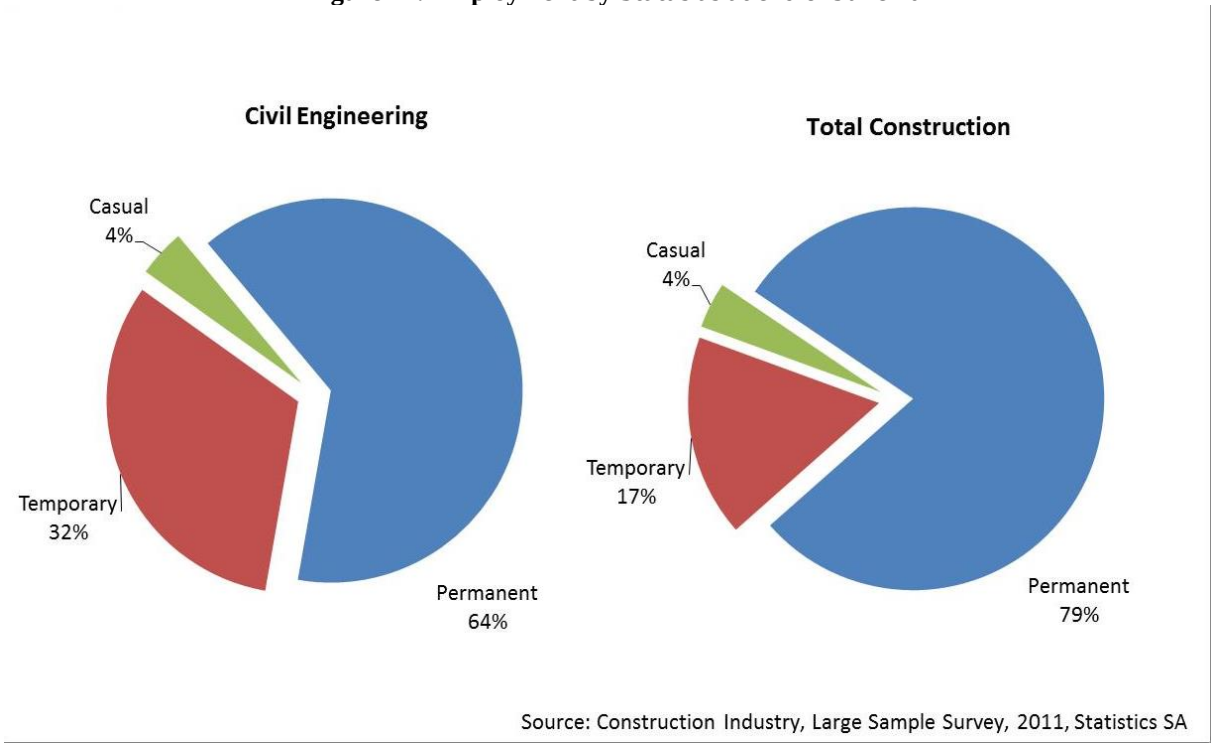


Figure 22: Employment by Status as at end of June 2011



As indicated in Section 2.1.3 of this report, considerable progress has been made in addressing BBBEE in the sector and the consulting engineering sector as a whole continues to move closer to the target of achieving 30% economic interest held by black people and 10% held by black

women. In December 2013, 29.8% of total executive staff within Private Limited consulting engineering companies were black.

In a recent address, the President of the South African Institution of Civil Engineering (SAICE)[24] noted that transformation is running smoothly in the civil engineering industry. He went on to add that SAICE was made up of 18 000 qualified civil engineers (there are 30 000 civil engineering practitioners in South Africa in total), most of whom were young engineers. Those members falling into the age group of 35 years and younger, made up 51% of the institution's total membership, with 66% being black. Those members between the ages of 36 and 55 formed 30% of SAICE's membership, with 40% being black, while those 56 years and above formed 20% of the institution's membership and 6% were black civil engineers. According to SAICE, the shortage of civil engineers in South Africa remain and for every engineer in South Africa there are currently 3 000 people.

Whilst there remains a gap between supply of black engineers and demand, designation of the civil engineering sector will have a positive impact on transformation of the sector as it provides an opportunity to create additional jobs and it is acknowledged within the sector that any action that improves employment prospects improves transformation. An increasing workload will force civil engineering companies to invest in skills development of previously disadvantaged individuals which in turn will entice more students into the profession.

3.2.4 Calculation of multipliers

Assumptions

The information on income, expenditure and employment above will now be used as the basis for calculating the multiplier effect of the civil engineering industry.

Table 13: Assumptions for calculation of Multipliers for consulting engineering firms

		R million	R million	Notes
Output	Services		98087	Table 9
Intermediate cost	Purchases	41307		Table 11
	Payment to construction sub-contractors	23704		Table 11
	Rental of plant, machinery and equipment	2440	67451	Table 11
Gross operating surplus			30636	(output – cost)
Compensation of employees			20997	Table 11
Tax			1869	Stats SA Construction census, 2011
Imports			9808.70	10% of output
Number of employees			152 7	

[24] Transformation in civil engineering industry steady, but skills shortage persists, Engineering News, March 20, 2014

Multipliers

An income multiplier of 1.69 means that for every additional R 1 million spent on the construction of civil engineering structures R 1.69 million circulate through the economy due to spending of salaries and profits.

A job multiplier of 0.64 means that for every additional R 1 million spent on the construction of civil engineering structures, these firms are able to create 0.64 job opportunities at a Civil Engineering firm.

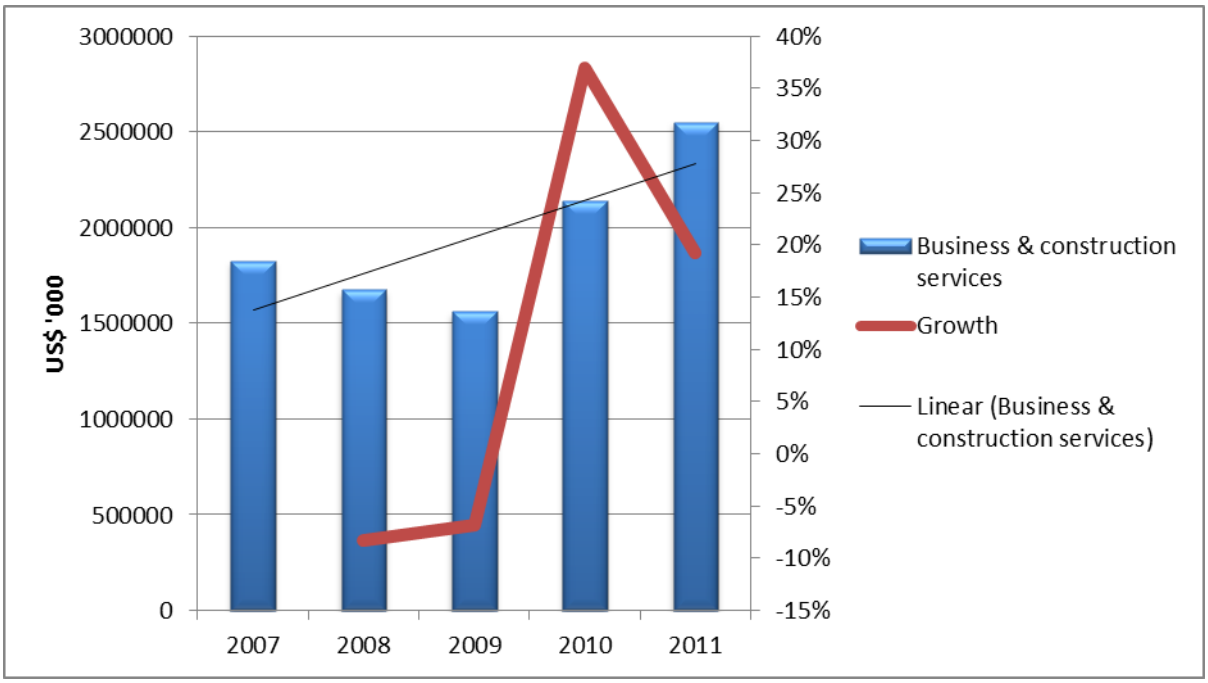
Table 14: Income & Job Multipliers: Consulting Engineering Firms

	Multiplier
Income multiplier	1.69
Job multiplier	0.64

3.2.5 Imports and Exports

Given the lack of statistical data within South Africa on trade in services, it is not possible to gauge the actual level of imports of civil engineering services specifically. Working off international datasets it is possible to get data on imports of business and construction services as shown in the Figure 14. In 2011, South Africa's imports of these services amounted to some R18.7 billion. Overall the trend in imports is upwards with a 65% increase in the level of imports recorded between 2009 and 2011. This is a concerning trend as it indicates increased levels of foreign competition in the local market.

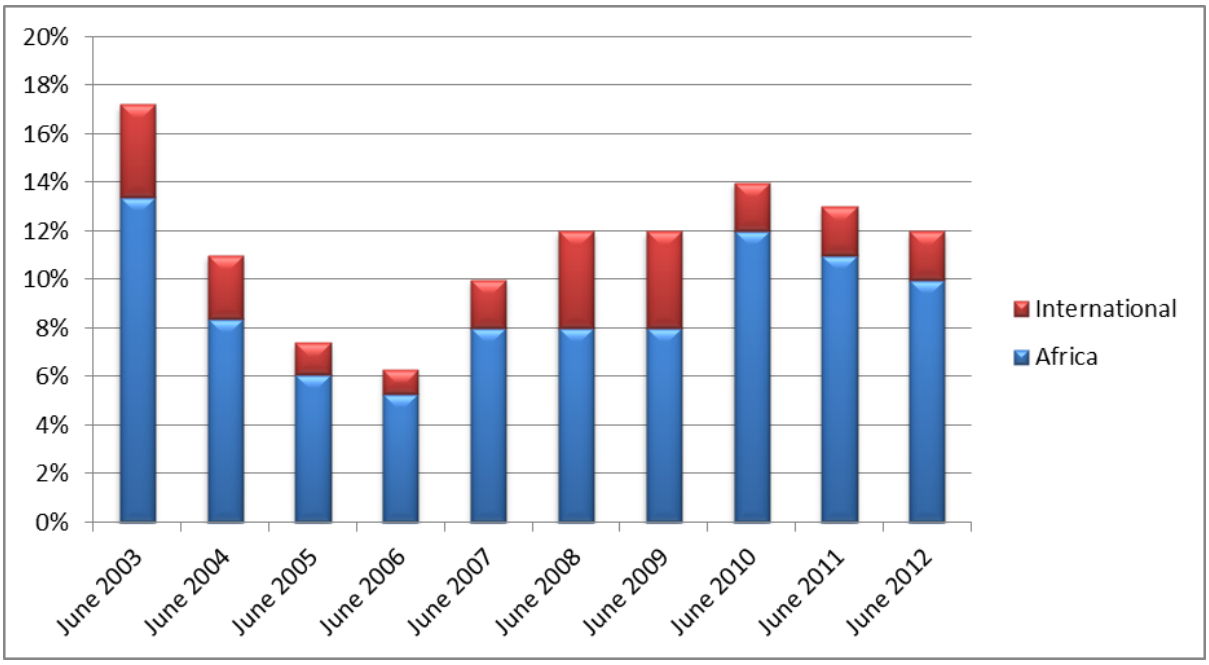
Figure 23: South Africa's Imports of Business and Construction Services



(Source: Trademap which is based on ITC calculations based on World Trade Organisation, International Monetary Fund Statistics)

Exports, particularly exports to Africa are an important aspect of the overall consulting engineering industry. In June 2012, some 10% of total fees were earned from business in the rest of Africa and 2% from international sources. As shown in the Figure 20, the importance of the export market to the sector fluctuates on an annual basis with the 2012 figures reflecting a slight decline which could be attributed to the general levels of economic decline in global markets.

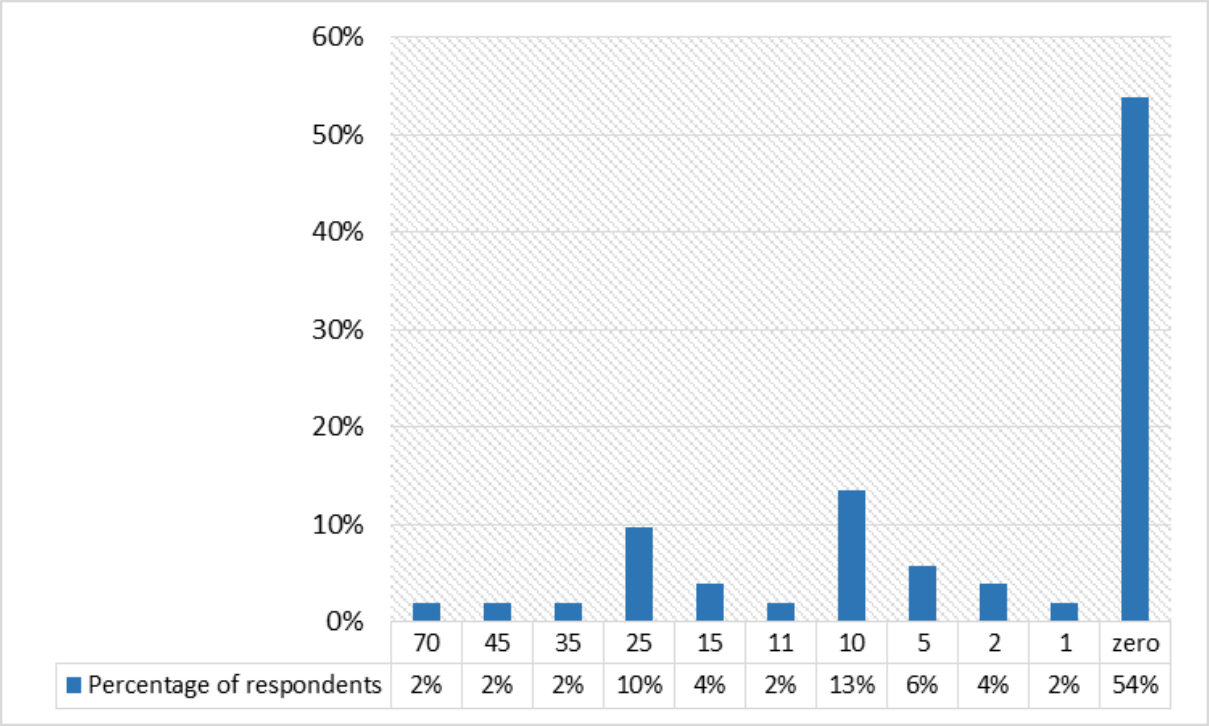
Figure 24: Sector Exports as a Percentage of Fee Earnings



(Source: CESA Bi-annual Economic and Capacity Surveys)

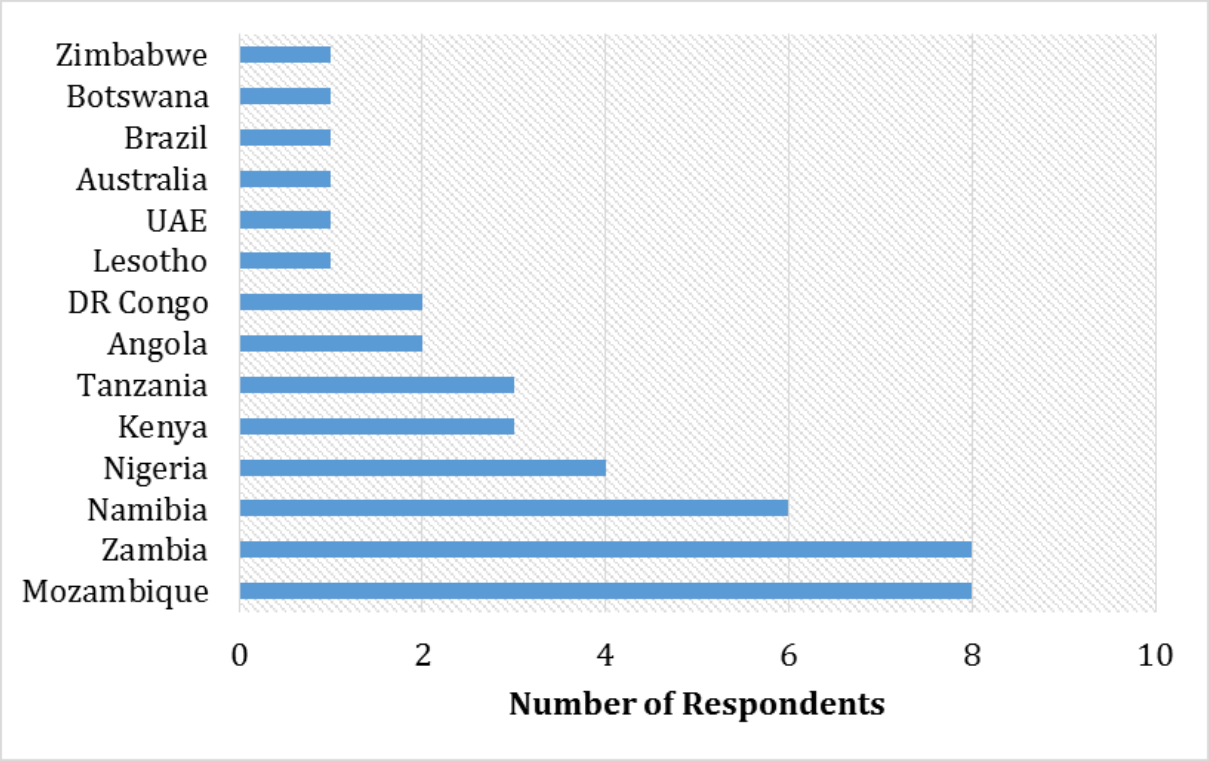
Specifically with regards to civil engineering, over half the local companies are not operating in export markets. Of those operating cross border, 10% earn 25% of their turnover cross border, 13% earn 10% and 6% earn 5%. Exporting companies tend to be the larger companies employing 50 people or more.

Figure 25: Percentage of Civil engineering Turnover earned Cross Border



(Source: CESA Survey to Civil Engineering Members)

Figure 26: Key Export Markets for Civil Engineering Companies



(Source: CESA Survey to Civil Engineering Members)

Key sectors in which civil engineers are working cross border are human settlements, mining, water infrastructure, sanitation infrastructure and roads.

The opportunity for increased exports, especially to Southern Africa, is extremely positive. In addition to the PIDA Programme mentioned earlier, SADC has recently (August 2012) released the Regional Infrastructure Development Master Plan (RIDMP). The Plan defines SADC's infrastructure development strategy and constitutes the basis for prioritization of projects as well as the modus operandi for implementation. The Strategic Framework forecasts both requirements and an implementation roadmap over a duration of fifteen years. The plan will be implemented in three phases: Short-term 2013-2017, Medium-term 2017-2022 and long-term 2022-2027[25].

The overall estimates of the investment programme of the RIDMP are US$558.1 billion[26]. Whilst this remains a rough estimate at this stage, it does indicate the level of investment that is going to be required and the opportunity that this offers to built environment professionals in general and civil engineers in particular.

There is a leverage effect from South African consultants working regionally. Being at the forefront of project development through the conducting of pre-feasibility studies, South African civil engineers can be used very effectively to identify bankable projects for SA Inc. This would encompass both service providers such as construction companies and manufacturers of items such as structural steel.

3.2.6 Competition and Price Considerations

Like many sectors in the South African economy, the civil engineering industry is dominated by a few large players who collectively account for some 30%to 40% of total industry employment. Outside of the large companies there are a large number of small and medium sized operators who, as indicated previously, are dependent on provincial and local government for their revenue.

Consolidation within the industry is evident and increasing as illustrated by the mergers and acquisitions outlined in the table below.

Company	Origin	Date in SA	Market entry vehicle
AECOM	USA	November 2012	Merged with the local company BKS to form AECOM South Africa
Hatch	USA	April 2013	Merged with the local company Goba to form Hatch Goba
Mott McDonald Group	United Kingdom	Active in SA for a number of years but made acquisition in 2013	Acquired local engineering concern, PD Naidoo & Associates (PDNA)
Royal Hoskoning	Netherlands	August 2012	South African company SSI was renamed Royal HaskoningDHV following a merger between Royal Haskoning and DHV Group, of which SSI

[25] Regional Infrastructure Development Master Plan
[26] SADC : Executive Summary of the Regional Infrastructure Development Master Plan, August 2012

Company	Origin	Date in SA	Market entry vehicle
			was part
SMEC	Australia,	June 2012	Acquired local company Vela VKE
WorleyParsons	Australia	2008 onwards	Acquired Pangaea in 2008 to form WorleyParsons RSA. Acquired KV3 in 2011 and TWP Holdings Ltd. (TWP) in 2013
WSP	United Kingdom / Canada	1999	South African subsidiary is 74%-owned by WSP Global, with the balance held by Newssheft 969.

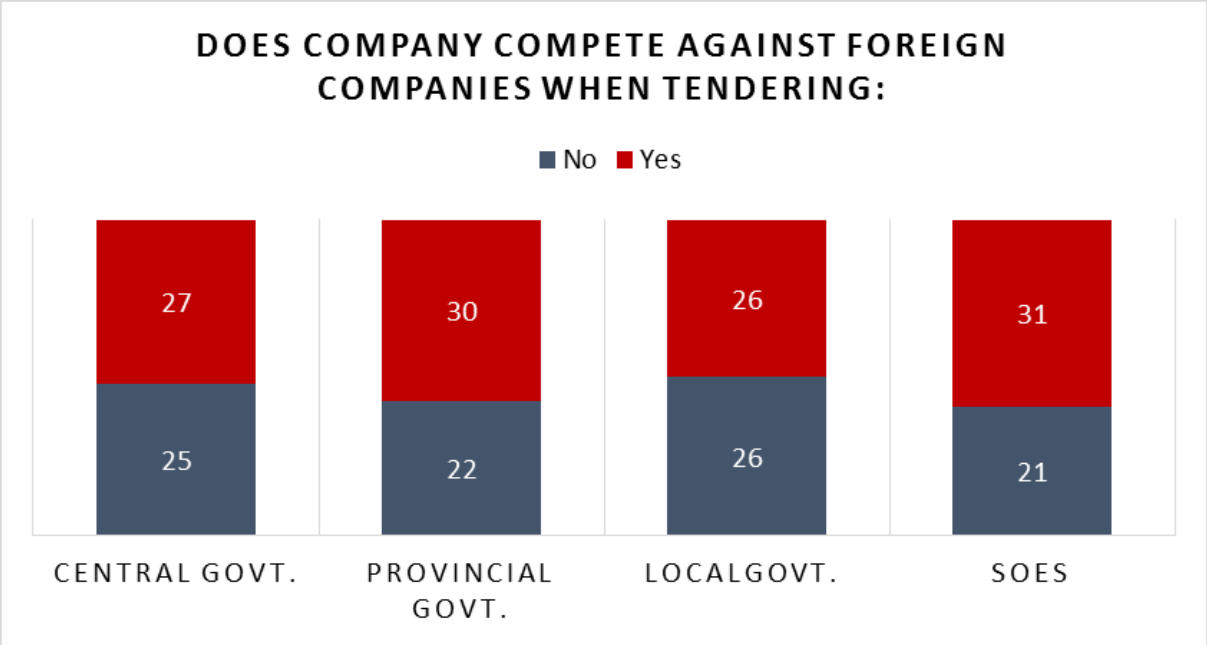
(Source: Corporate Websites)

This is however not only a South African phenomenon as internationally companies consolidate to cope with larger and more complex projects. In 1995, international consulting engineering firms with revenues greater than R1 billion accounted for 20% of total industry revenues. By 2008, this had risen to 69%[27]. Consolidation is not of itself a bad thing especially in a market where skills shortages are evident and there are economies of scale that can be enjoyed through consolidation. This will ultimately make the South African sector more globally competitive. There are also greater opportunities for training, development and skills transfer within larger companies.

Foreign competition in the tendering process occurs across the board with civil engineers reporting the most instances at the level of provincial government and SOEs. In a questionnaire distributed to CESA civil engineering members, when asked how much revenue the company loses annually because public enterprises buy from foreign suppliers, respondents answered that this figure lies anywhere between 30% to less than 5%.

[27] Rhode, 2009

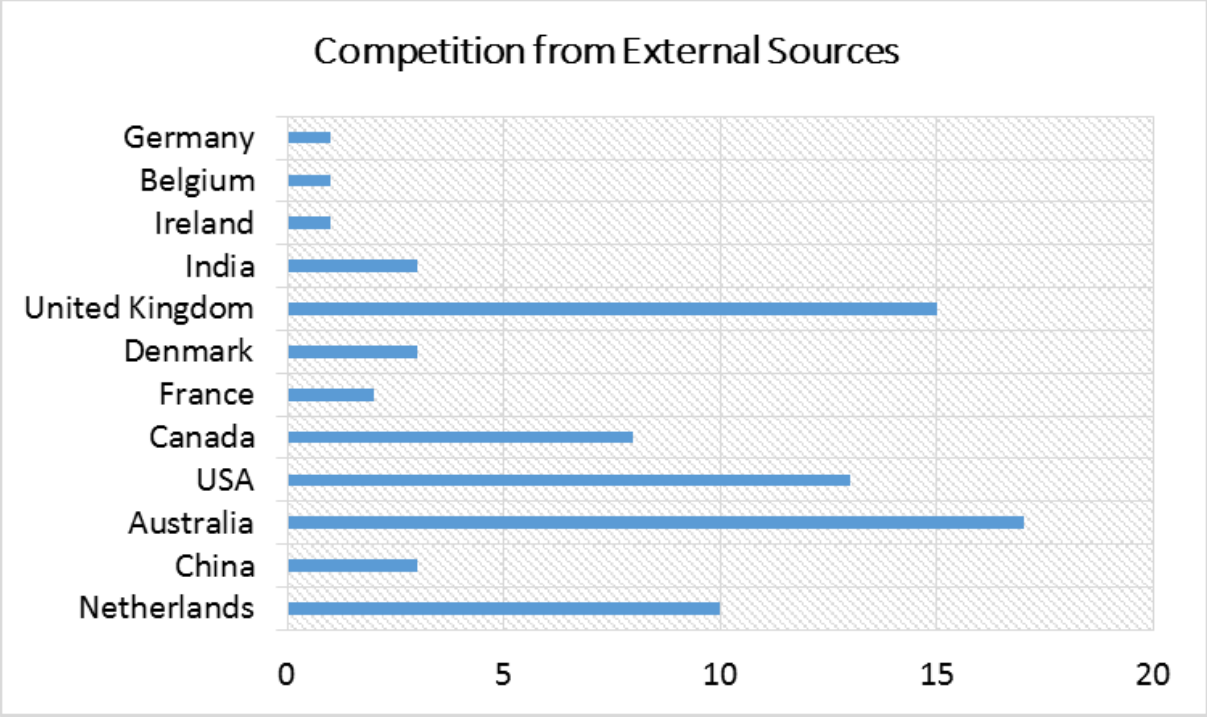
Figure 27: Instances of Foreign Competition in Tendering



(Source: CESA Survey to Civil Engineering Members)

This competition is originating primarily from Australia, the United Kingdom, the United States, the Netherlands and Canada.

Figure 28: Origin of Competitors for Government Tenders



(Source: CESA Survey to Civil Engineering Members)

The civil engineering sector believes that foreign companies are awarded tenders at the expense of local companies due to their ability to come in at a lower rate than the local

companies as they are not bound by ECSA rates. Foreign companies are also in a position to use provincial and local projects as loss leaders to gain a foothold in the South African market and keep junior engineers busy. The manner in which the government tender system is currently configured means that the company with the lowest bid wins. This is of grave concern to a sector where quality should never be sacrificed for the lowest bid. The initial design and scoping of a project is critically important to long term sustainability and maintenance of infrastructure. Fees spent in preparation of a project will ultimately result in a better and more cost effective project with overall project life cycle cost minimization.

There are already extensive linkages from international consulting engineering within the large companies and should the sector be designated, foreign companies entering the South African market would need to partner with small and medium size firms. Potentially this can significantly bolster growth in the small and medium segment of the consulting engineering market creating globally competitive companies at this level. This would be particularly relevant at the level of SOE contracts where substantial projects are generally being led by companies with foreign connections and where small companies are currently not being awarded contracts.

The costing structure of the South African consulting engineers, including civil engineers is transparent. Costings are either fee based on the cost of works or time based with reimbursable expenses. Where the scope of a project is unknown, generally the cost is based on a time based fee plus reimbursable expenses. Where the scope of a project is known, firms generally work on a percentage of project cost. Fees can range from 6% for a large project up to 20% for a small project. Time based fees reflect the level of experience of the engineer. Indicative time based fees are as follows.

Table 15: Indicative Hourly Rates for South African Consulting Engineers

Category of Staff	Indicative Rate
A: Top practitioner whose expertise is nationally or internationally recognized	R1,760 per hour
B: Partner or Director	R1,500 per hour
C: Salaried Professional Staff	R880 per hour
D: Salaried Technical Staff	R640 per hour

(Source: Board Notice 175 of 2009 as published in Government Gazette, 4 January 2010)

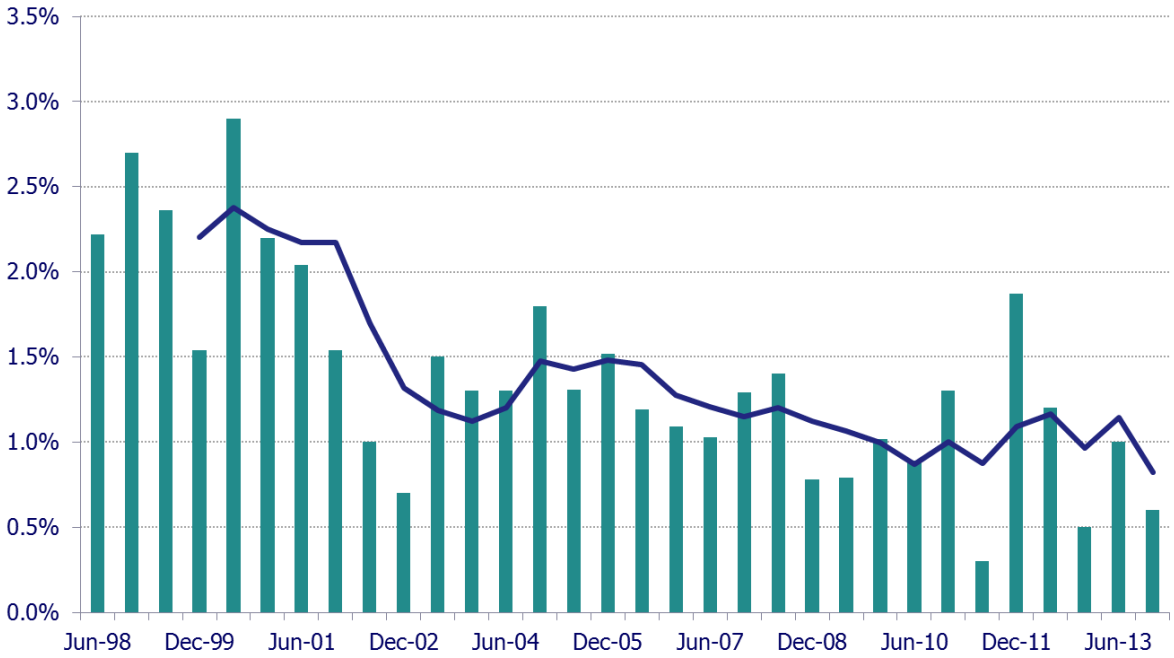
The mean hourly rate charged by an engineer in the USA is US$125/hr[28]. This translates to just over R1,000 per hour for a salaried professional engineer in the USA meaning that South African rates are slightly lower than their international counterparts. Competition in tendering generally eases during a time when the availability of work increases and intensifies during periods of work shortages. An easing of competition will generally lead to an increase in prices, while price inflation is capped during periods of work shortages due to the fact that an increasing number of firms tender on the same project. The tendering process is costly and time consuming, and higher levels of competition significantly increases the risk for the engineering firm. In CESA's bi-annual member survey, December 2013, the percentage of respondents saying that competition was very keen to fierce continued to increase aggressively, up from an

[28] IEEE-USA Consultants Fee Survey Report, 2011 Edition.

average of 66,9% in the June 2011 survey, to 95,7% and 95,2% in December 2011 and June 2012 respectively, to 99.8% in December 2013. Discounting has subsequently increased from an average of between 15% and 20% in 2010 to 23,8% as at June 2012 and 24% at December 2013. Larger firms discounted more aggressively, averaging 40%, while smaller firms (employing less than 10 people) discounted by a lower average rate of 26.5%. The survey to CESA Civil Engineering members reported some instances of extreme discounting of up to 70%.

The CESA survey of civil engineers highlighted that discounting is particularly an issue when tendering in the public sector with 94% of respondents indicating that the practice is prevalent. The reason for this discounting is the fierce competition around pricing which, as highlighted earlier, is impacting on the quality of engineering services being procured by public enterprises. Designation would allow companies to compete on an equal footing and would ensure ECSA costing guidelines are utilised consistently by tendering entities. This in turn would allow for civil engineering services to be procured on a quality cost basis and not on price and preference only. With fierce price competition there is further very little funds available to devote to training and development. This is supported by the data illustrated in Figure 20. The direct training costs as a percentage of payroll have moderated to 0.6 percent in December 2013 representing a downward trend in training spend. With less pressure on pricing, companies would be in a position to allocate funds to the training and development of staff.

Figure 29: Spend by Consulting Engineering Companies on Training (Direct costs): Percentage of Payroll



(Source: CESA Bi-annual Economic and Capacity Survey: June-Dec 2013)

The barriers to entry into the civil engineering field are high given that engineers operate in high end jobs where a high level of education and training is required. A further barrier is that all engineering practitioners, including both professionals and candidates, are required to register with the engineering council, ECSA. This applies to foreign engineers working in South Africa

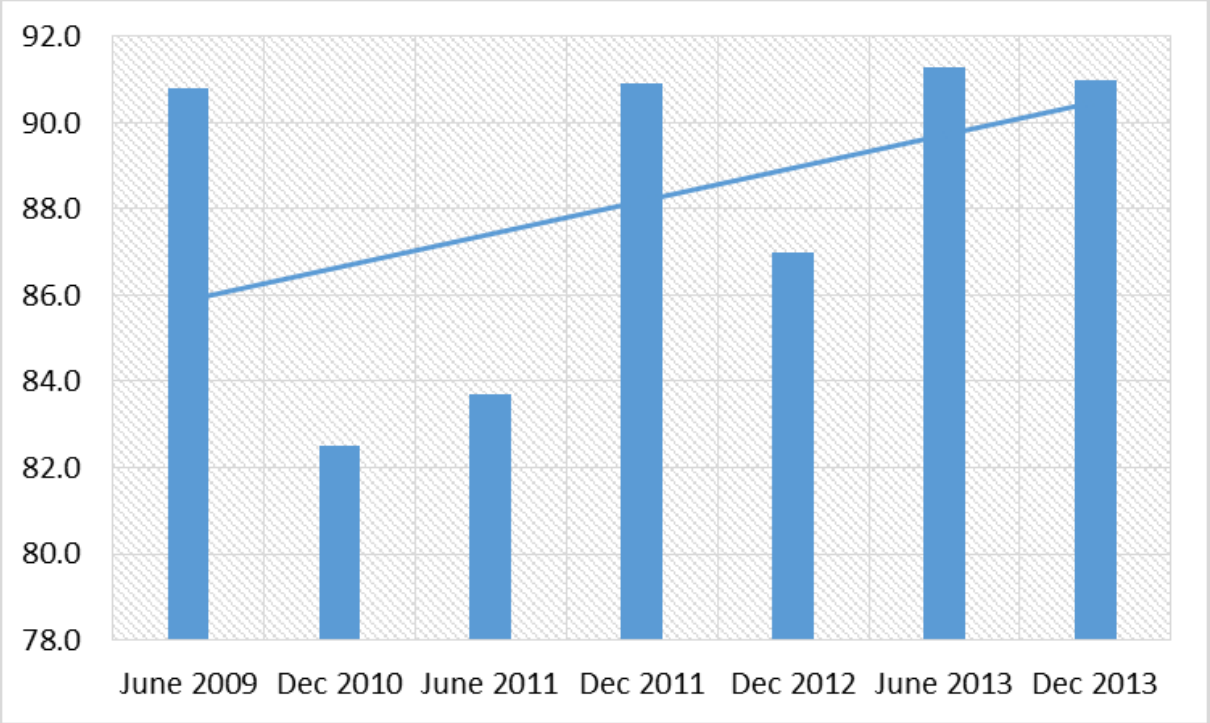
and ECSA recognizes accredited qualifications or qualifications in terms of the Washington Accord[29], the Sydney Accord or the Dublin Accord.

3.2.7 Availability and Security of Supply

Capacity levels at the end of 2013 were on average 91.8% across the consulting engineering sector. A shown in Figure 20, this rate is on an upward trend. The average utilisation rate of larger firms was the lowest, at 85.7% compared to an average of 93.9% for medium size companies.

Within the civil engineering sector specifically, the capacity utilisation rate is currently 81.6%. Whilst still relatively high, it is interesting to note that it is the small companies that report the lowest capacity utilisations with companies employing between 6 and 10 staff reporting an average capacity utilisation of 77.5%

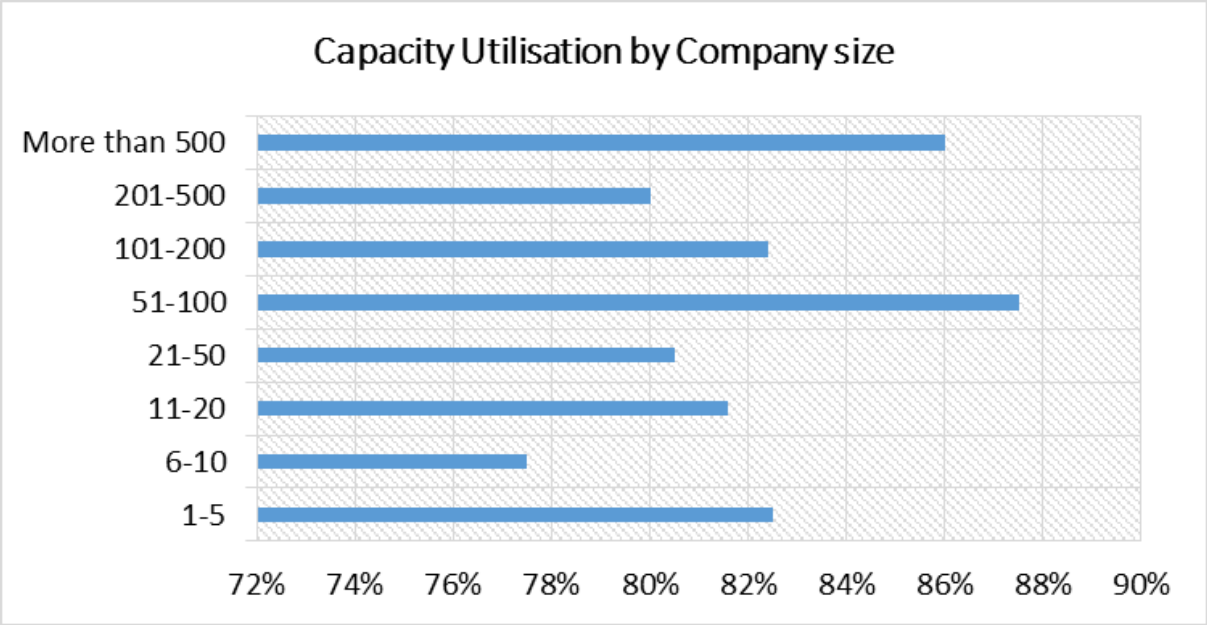
Figure 30: Capacity Utilisation Rates



(Source: CESA Bi-annual Economic and Capacity Survey: June-Dec 2013)

[29] Signed in 1989, the Washington Accord recognises substantial equivalence in the accreditation of qualifications in professional engineering, normally of four years duration. The Sydney Accord commenced in 2001 and recognises substantial equivalence in the accreditation of qualifications in engineering technology, normally of three years duration. The Dublin Accord is an agreement for substantial equivalence in the accreditation of tertiary qualifications in technician engineering, normally of two years duration. It commenced in 2002.

Figure 31: Capacity Utilisation Rates in the Civil Engineering Sector by Company Size



Companies within the civil engineering sector are of the opinion that they have the capacity to take on additional work should the sector be designated despite the relatively high levels of capacity utilisation. Target capacity utilisation levels for technical staff in the industry are 100%. This would be done though one, or a combination of, the following measures:

- Employ more staff
- Employ graduates and mentor to capacity
- Training and development of current staff
- Consolidate resources from different branches
- Make use of specialised sub-consultants
- More efficient utilisation of staff on fee-paying projects
- Turn away un-profitable work

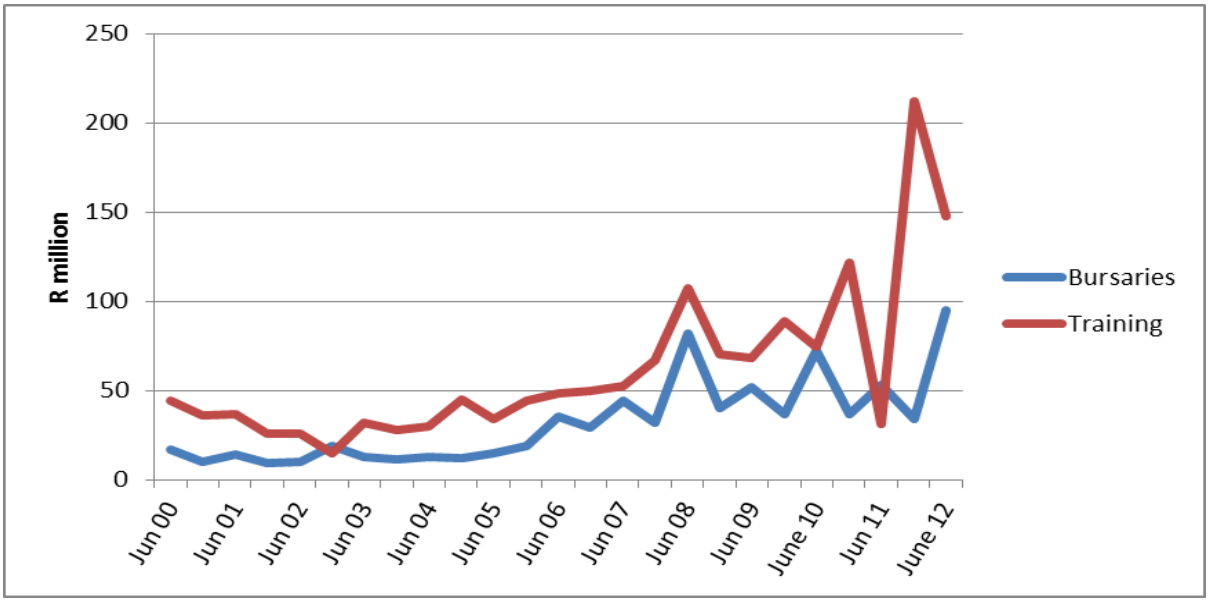
3.2.8 Education and Training

The availability of skills remains a major area of concern in the sector, and could threaten expansion in the sector. However, firms are investing in skills development and direct training costs as a percentage of payroll are standing at 1.2% against a target of 1.5 % and bursary expenditure on black students as a percentage of payroll is standing at 0.8% against a target of 0.3%, as shown in Figure 22.

Given the pressure of skills shortage within the industry, firms provide both in-house and external training to staff with a number of companies involved in innovative external skills

development programmes targeting future engineers and technicians. For example, Hatch South Africa provides financial assistance for a programme called Siyakhula, which aims to facilitate math and science education and introduce the engineering and built environment faculty to high school learners in the Ivory Park area, in Gauteng. Hatch also runs a programme called Naletsana Schools Development programme, which mentors and prepares learners from secondary level education all the way through to tertiary level.

Figure 32: Spend on Education and Training



(Source: CESA Bi-annual Economic and Capacity Survey: January – June 2012)

Civil engineering firms are more likely to invest in training and development activities if the sector is designated. The commitment from government will boost the confidence of firms to invest in building additional capacity. This in turn will ensure long-term security of supply. If there is a long and sustained pipeline of projects for the sector, companies will invest in education and training at the level of unregistered technical staff to move this bracket to registered technical staff. These job categories currently have a high level of black incumbents and this is one of the principal groups that stand to benefit directly from designation.

Designation of the sector would create a less cyclical and more-sustainable workflow which would allow engineering companies to create jobs to take on additional work. Designation would raise the profile of the civil engineering sector and would make civil engineering an attractive career option for young under-graduates. Designation would further financially create space for more experienced civil engineers to work closely and for extended periods with younger engineers/technicians raising the overall skill profile of the sector.

In addition to the direct shortage of engineering skill experienced within the private sector, Civil Engineering companies find the lack of technical expertise within government structures a hindrance to doing business with the public sector. This impacts at many levels starting with the lack of ability within local and provincial departments to effectively define projects and a relevant scope of work which then leads to a poorly conceived Request for Proposal (RFP). Civil

Engineering companies are often left to define the scope and cost it through the medium of a tender. When tenders are evaluated, they are not always evaluated on the basis of an equitable scope of work. This is exacerbated by a general lack of understanding for the complexities of civil engineering with government structures which results in little regard being paid to proposed technical solutions and quality when adjudicating tenders. Once a tender is awarded, the lack of technical expertise hinders overall project management and departments are often unable to respond to technical questions from engineering professionals. Engineering concerns find themselves driving internal processes in the interests of getting projects complete.

This is an issue that was raised in the report compiled by the CSIR: The State of Municipal Infrastructure In South Africa and its Operation and Maintenance. The report cited an SAICE research report as follows:

“In support of its 2005-2009 Sector Skills Plan submission, the Construction SETA (Sector Education and Training Authority) appointed SAICE (the South African Institution of Civil Engineering) to research the nation's capacity and skills development needs relating to civil engineering professionals (i.e. civil engineering technicians, technologists and engineers). A particular focus of the study has been on local government:

"Few if any municipalities have had an increase in technical staff since the [2000] demarcation change …, yet [they] are now required to deliver, operate and maintain services over far larger areas than before, with population, and length of roads and pipes, having increased from two to 10 times in some instances."

A census of all local and district municipalities and metros revealed that, of the 278 local and district municipalities, 83 have no civil engineers, technologists or technicians, and 44 have only one civil engineering technician. "Those municipalities that have civil engineering staff report 35% vacancies" (Lawless, 2005:5).

The SAICE study also found that there are proportionately far more unfilled posts at the senior professional and technical level than in any other category of positions in local government. The fact that posts at the leadership and governance level of municipal engineering departments are largely filled, but often by managers without engineering training, stands in stark contrast to this (SAICE, 2004, Section 10.5.1).”

Designation of the civil engineering sector would directly address some of the issues relating to the lack of technical capacity within government structures thereby impacting on governments’ ability to deliver services. Part of the package of conditionalities relating to designation of civil engineering skill would need to incorporate an on-going training and skills transfer programme between government structures and the private sector to provide technical support where lacking and to develop this basic engineering capability within government structures. If projects are being correctly scoped and delivered on time and within budget, service delivery levels will automatically improve.

3.2.9 Local Content

Civil engineers have a major influence on the type of products and services purchased during the construction and even in the operations and maintenance phases. In view of this, the civil engineering firms surveyed as part of the preparation of this application were asked to give an indication of the percentage of local content in projects specified in term off the following. Table 13 indicates that the propensity to purchase from foreign suppliers is relatively modest with between 5 – 10% of inputs purchased directly from foreign suppliers.

Table 16: Propensity to Import in the Construction Industry

	% share
Local manufacturing (i.e. product manufactured in South Africa)	15 – 80%
Local suppliers (i.e. product imported by South African companies)	10 – 80%
Foreign suppliers (i.e. product bought directly from foreign company)	5 – 10%

Civil engineers are in a position whereby they can specify what products and services will be used in a project and engineers surveyed point to a historical preference within the sector to utilise South African goods and services as opposed to imported goods and services. Specification of local goods and services should form part of the designation process.

4. Conditionalities

A. Project assessment:

   1) The sector will undertake an assessment to determine how projects can be leveraged to stimulate local production.

   2) The sector will commit to maximize local procurement.

   3) The sector will commit to assess import replacement.

B. For every R1 million obtained from public sector designated projects, the sector will commit 10% to skills transfer.

C. Make available capacity to government, especially local government where the greatest need for engineering capacity exists.

5. Verification and Enforcement

A joint committee should be established to observe and monitor compliance with the specified conditions. The committee should consist of representatives from CESA, BEPEC and **the dti**. The committee should meet quarterly to review progress on the following:

- Tenders awarded in terms of the designation status of the consulting engineering sector; and
- Compliance with the conditionalities.

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Annexure A: Multiplier Data Sources and Methodology

For the purposes of this report, the "Fiscal Multiplier" was used, to analyze the effects of government spending, or other exogenous changes in spending, on aggregate output.

Definition of the Fiscal Multiplier (Source: www.wikipedia.org)
In economics, the fiscal multiplier is the ratio of a change in national income to the change in government spending that causes it. More generally, the exogenous spending multiplier is the ratio of a change in national income to any autonomous change in spending (private investment spending, consumer spending, government spending, or spending by foreigners on the country's exports) that causes it. When this multiplier exceeds one, the enhanced effect on national income is called the multiplier effect. The mechanism that can give rise to a multiplier effect is that an initial incremental amount of spending can lead to increased consumption spending, increasing income further and hence further increasing consumption, etc., resulting in an overall increase in national income greater than the initial incremental amount of spending. In other words, an initial change in aggregate demand may cause a change in aggregate output (and hence the aggregate income that it generates) that is a multiple of the initial change.

Formula for calculation of multiplier

$k = \frac{1}{1-\frac{MPC}{Y}}$ Where $MPC = C - T - I$

k = multiplier
MPC = Marginal Propensity to consume
Y = income (output)
C = Consumption (Compensation of employees + gross operating surplus
T = Taxation
I = Imports

Data Sources

The tables published by Statistics SA in Report 04-04-01 (2005) were used as a basis for the development of the input-output tables. Because the consulting engineering industry is not a clearly defined sector in the standard input-output tables, but included as part of a broader "Architectural, engineering, other relation consultant fees (I158)", a questionnaire was distributed to the top 5 Consulting Engineering firms in the country, to expand on the existing information. Two of the five firms returned their questionnaires. Table 3, therefore represents an aggregate of the Statistics SA Tables as well as the 2 returned questionnaires.

Data pertaining to consulting engineering firms' income as well as compensation of employees were obtained from the CESA Bi-annual Economic & Capacity Survey, prepared by Industry Insight.

The tables published by Statistics SA in Report 04-04-01 (2005) were used as basis for the development of these tables. The categories used included "site preparation"; "building of complete constructions"; "building installation" and "building completion"

Data pertaining to the national spent on construction (turnover) as well as compensation of employees were sourced from Gross Fixed Capital Formation data published by the SA Reserve Bank in its Quarterly Bulletin as well as from the Quarterly Labour Force Survey published by Statistics SA.

Assumptions

Where the inputs is the Statistics SA in Report 04-04-01 (2005) were used as basis for the development of the input-output tables in this report, the amounts were expressed as a percentage of turnover (output) which were multiplied with the 2011 turnover to give an estimate of the inputs for 2011.