

The future of state-owned enterprises in South Africa: Why R&D matters

Summary

State-owned enterprises (SOEs) in South Africa are crucial to industrial development. The future role of SOEs depends on their ability to form the bedrock of the economy while remaining efficient and internationally competitive. This policy brief reiterates the importance of the role that R&D has played in the operational efficiency of SOEs. The brief presents evidence of decreased R&D activity at SOEs and recommends actions to regenerate such activity.

Introduction

South Africa's focus on industrialisation

Goal 9 of the Sustainable Development Goals (SDGs) indicates three aspects of sustainable development: infrastructure, industrialisation, and innovation. Industries such as labour-intensive manufacturing, mid-skill service exports and process outsourcing have been identified as good for growth and job creation in the National Development Plan (NDP) 2030. Innovation is seen in the NDP as advancing the technological capabilities of industrial sectors and promoting the development of new skills. Indeed, with its ambitions to catalyse local business growth off infrastructure upgrades and expansions,

infrastructure investment has been at the heart of the South African government's economic policies and strategies for more than a decade. A strong focus of this "leveraging" is crowding infrastructure investments to promote the localisation of procurement opportunities, skills development and job creation. In this context, repositioning and boosting the role of SOEs is an important part of the Nine Point Plan that was introduced by government in February 2015 as a response to slow economic growth.¹

Challenges with the R&D capabilities of SOEs

A study conducted by the Human Sciences Research Council for the Department of Science and Technology (DST), however, has found that there are bottlenecks in the R&D functioning of SOEs. For example, SOEs have a shortage of highly skilled technical workers who are critical for the support of R&D work conducted by scientists and engineers. There is also little evidence of the nature and extent of SOEs' linkages with global sources of expertise, and insufficient evidence on existing local capabilities and future needs. Both of these elements are crucial for innovation to bloom.

The critical economic role of efficient and innovative SOEs

Globally and locally, SOEs are strategic economic actors

Globally, some SOEs demonstrated such outstanding performance in 2011 that an Organisation for Economic Cooperation and Development (OECD) report estimates SOEs to have accounted for about 6% of the world's GDP.² In recent years many developing countries (including South Africa³) have recognised that SOEs are key to services that promote economic development, but, vitally, that they need to provide these services in an efficient manner. Historically, operational efficiency required that South African SOEs do R&D geared at improving and maintaining their sustainability. It is therefore essential that we evaluate the performance and understand the commitment of SOEs, particularly the top South African SOEs, to R&D. The largest four South African SOEs (Eskom, Transnet, Denel and Telkom) account for 91% of the assets, 86%

of the turnover, and 77% of the total employment of SOEs.⁴ Denel, Armscor, Transnet, Telkom and Eskom – all of which are considered key entities for economic development under the new strategic path – contribute 99% of all R&D performed (Box 1). Given the current economic environment in South Africa, there is pressure, from some quarters, for SOEs to operate entirely off revenues and to source technology upgrades or recapitalisation programme funding from financial markets, without government guarantees or bail-outs.⁶

Levels of R&D performance of South African SOEs have fallen

Figure 1 shows that the SOEs show a very small growth in R&D investment since 2011/12, amounting to 15.2% of BERD in 2014/15. Overall, while business expenditure on R&D is increasing, the increase is only marginal across the SOEs. In the wake of the volatility in the business sector's growth in R&D since 2009, they appear to be growing in concert with the rest of SA business (see also Figure 2 for the effect of the

global financial crisis on R&D personnel). It is striking how much the contribution of SOEs to R&D activity has decreased over 10 years, from a high of 27.9% in 2008/09 to 2014/15 levels of about half that amount. Much of this loss of R&D activity was due to major R&D operations shutting down in Eskom soon after 2008/09.

Reporting the R&D performance of SOEs

South African SOEs report on a set of indicators that are self-selected from international industry in order to benchmark themselves against international organisations with similar functions. Given local policy directives, however, the targets do require some reassessment. This is especially true when it comes to indicators of R&D performance. What is cause for major concern is the apparent underspending by some of the largest SOEs of board-approved R&D budgets over the 2011/12 to 2013/14 period considered in the HSRC study. This does not necessarily reflect that the relevant SOEs have reprioritised the importance of spending

Box 1: International trade and electricity generation: South Africa does not compete

In terms of the BRICS grouping of countries, South Africa rates poorly on indicators pertaining to trade performance and access to electricity for businesses.⁵ For example, consider performance in trading across borders: China outperforms the rest of the BRICS countries, and is ranked 96 amongst 189 countries for trading across borders. This is because China performs well on the criteria used in the World Bank's Doing Business survey series. China boasts lower domestic transport costs to the border as well as shorter times for documentary plus border compliance and, again, time to transport. Brazil and Russia's profiles show up very badly when it comes to export-compliance costs, but are far less expensive than South Africa where domestic transport costs for exports are concerned. Specific areas that contribute to South Africa's weak position in the ranking is the time (not necessarily cost) that it takes to finalise procedures for exports as well as the high cost of domestic transport, shown as 72% of the cost to export.

Table 1: BRICS performance: Trade across borders and reliability of electricity supply

Country	Time to export (hours)	Cost to export (\$US)	Cost of domestic transport as a % of cost to export	Reliability of electricity supply (index* 0–8)	Cost of electricity % income per capita
Brazil	102.4	2 344.1	49.4	5.6	28.6
Russia	153.8	2 369.1	31.4	8	93.1
India	178.6	950.3	45.8	5.5	442.3
China	53.8	913.0	33.5	6	413.3
SA	184.0	2 148.0	72.2	0	670.5

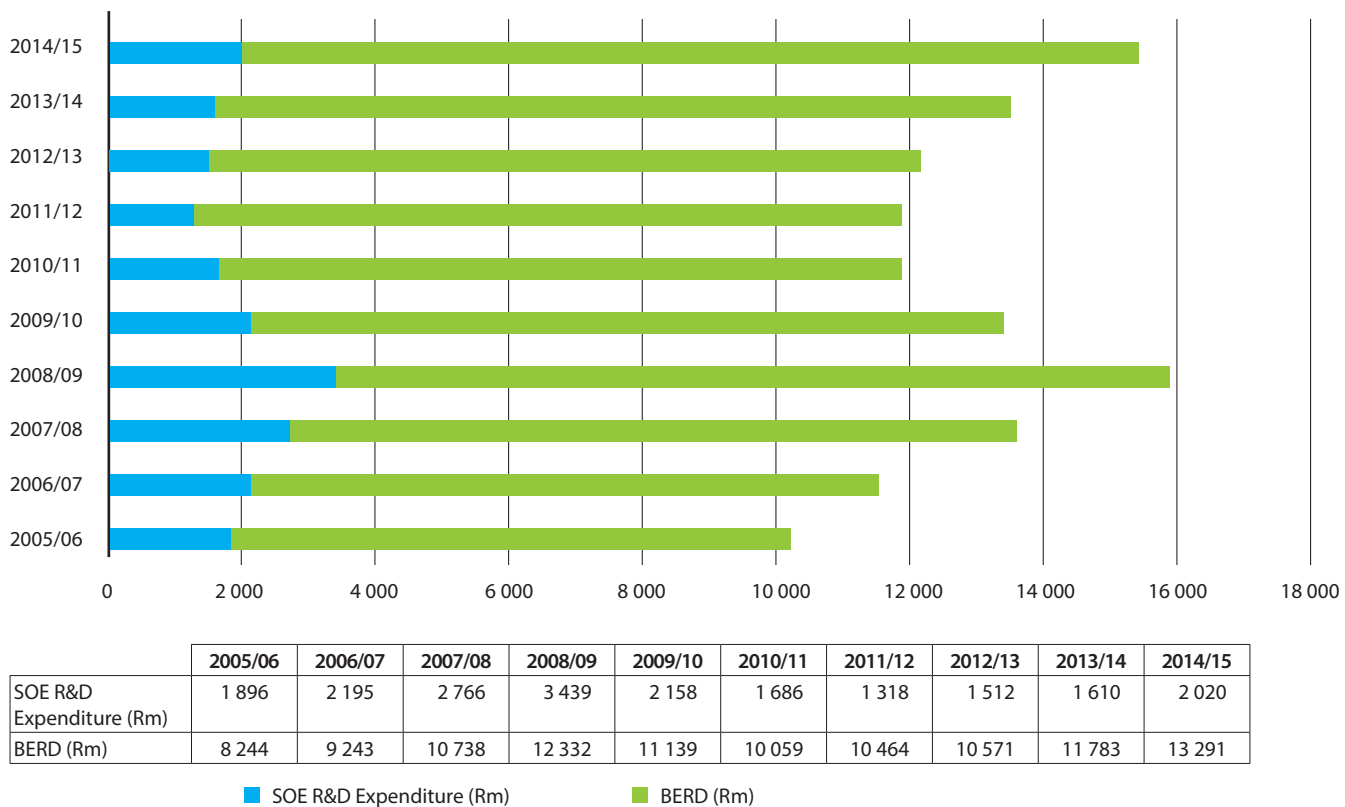
Source: *Doing Business 2016: Measuring Regulatory Quality and Efficiency* * 0 = low, 8 = high

on R&D, but, rather, that there may be problems at a practical level in deploying R&D funds. Especially important to note is that some SOEs are not setting targets for R&D expenditure levels as

part of their shareholder compacts. Indeed, some SOEs dropped the R&D expenditure as a key performance indicator at about the time when the first indicators of underspending on

board-approved R&D budgets appeared. It is not known whether this was a mistake or an oversight, but reporting on R&D indicators needs to be re-institutionalised.

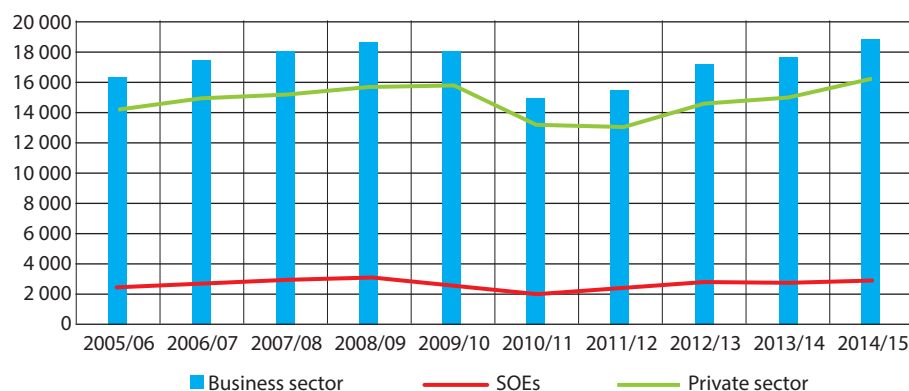
Figure 1: The R&D expenditure (in R millions) of R&D performing SOEs in South Africa from 2005/06 to 2014/15



Source: Adapted from the CeSTII Working Paper *Research and Development Trends in State-Owned Enterprises*⁷

Figure 2: Trends in headcounts of R&D personnel in the private and public sectors.

SOEs and Private Sector Headcounts of R&D Personnel (2005/06–2014/15)



Source: R&D data extracted from SA National Survey on Research and Experimental Development⁸

Linkages with the national system of innovation

Challenges with high-end capabilities and technical performance

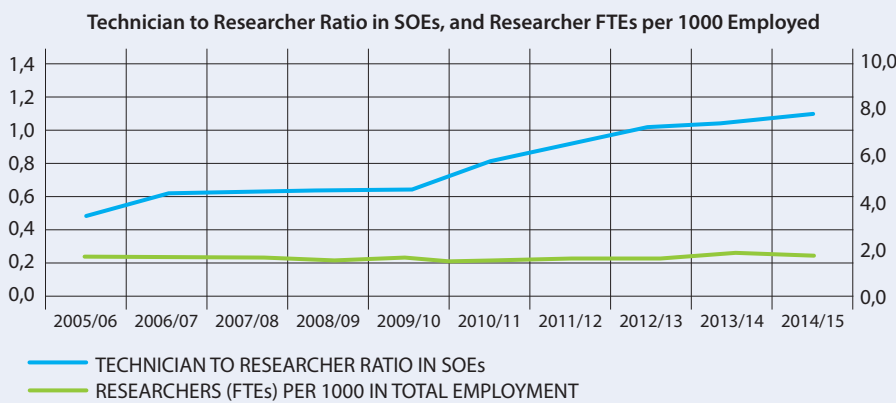
The prioritisation of investments and expenditure is typically influenced by how “burning” the requirement is. Since the output or delivery of efficient and reliable infrastructure is driven by the immediacy of need, research and technology investments are made within short- to medium-term (1–5 year) horizons. The annual reports of SOEs indicate that many are

Box 2: South Africa has a low research base

State-Owned Enterprises need a large and robust base of human resources from which to draw research and engineering expertise. Many SOEs are battling with an ageing skilled section of their core workforce and relatively low-skilled young employees.

South Africa's research base as a proportion of the workforce (Figure 3) is low compared not only to other countries with a relatively small employed labour force (for example, Singapore and Taiwan in East Asia), but even when compared to countries with a large research base (such as much of the OECD grouping of countries). It should arguably be ten times larger to compare favourably with any of these countries.⁹ There has been no real growth of researchers in the country as a whole, compared with the growth in general employment in the economy. This is a systemic problem; in other words, it is not specific to the SOEs. An element of this shortage of skills supply is identified in the proportion of female researchers, which in the business sector was around 36% in 2013/14. In the SOEs, this proportion was even lower at 26%.

Figure 3: Trends in national researcher FTEs, and the ratio of technicians to researchers in SOEs



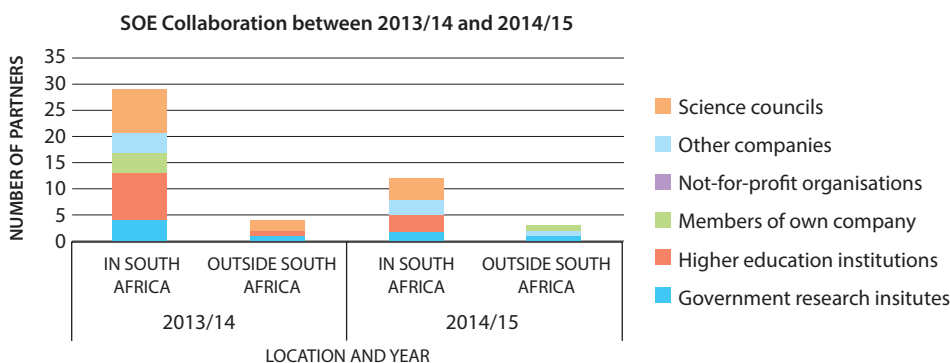
Source: R&D data extracted from SA National Survey on Research and Experimental Development

currently grappling with the challenge of addressing decades of neglect of technical modernisation. A considerable proportion of applied (and also experimental development research) is dedicated to technical performance optimisation and testing. This is an area where local competency should be used and strengthened. While the level of outsourced R&D by SOEs is relatively low, it is unclear whether this is due to SOEs competing overseas for highly-skilled and scarce knowledge workers or the unavailability of skilled technicians required for the maintenance of specialised research equipment. What the evidence does show (Figure 3), however, is that the number of technicians at SOEs has grown faster than the number of researchers engaged in R&D. This data could suggest that there has been a shift from strategic experimental research projects to a mode of operation that is more focused on maintaining production in South African SOEs. This suggestion is borne out by the evidence, where it can be seen that there has been a trend towards applied research at the cost of experimental development.

Local and global linkages of SOEs with knowledge and technology partners

The idea of a National System of Innovation emphasises the development of capabilities and knowledge and technology linkages in order to promote innovation. Many SOEs leverage off the local R&D "base" by collaborating with universities and research institutions to support the development of their infrastructure and technologies, and for continuous operational optimisation. Even if they do not all expressly use the National System of Innovation concept, their annual reports indicate that they are making progress with integration into the knowledge and innovation networks that include universities and research institutions. The available data (Figure 4) from South Africa's R&D Survey record the extent of collaboration

Figure 4: Number of partners engaged in partnerships, alliances and collaborations with SOEs



Source: Data extracted from SA National Survey on Research and Experimental Development¹¹

Note: SOE collaborations may involve more than unity for some partners. The number of SOEs engaged in in-house R&D activity was 19 (including subsidiaries) for these two years.

among those SOEs that perform in-house R&D,¹⁰ which reflects the importance of universities and science councils.

Corporate governance and the impact on R&D decision making

The links between poor corporate decisions and low impact research and technology investments are a very real concern and cannot be ignored without consideration of the risks. While objectively, South African SOEs perform rather poorly compared to those in the OECD countries,¹² South Africa still has rigorous, transparent and balanced policy systems and procedures for the approval of board appointments, assessment and review of SOE performance and board oversight. However, serious concerns have been raised that these oversight mechanisms are not operating as they should to prevent the mismanagement or abuse of public office for private gain.¹³ The growing evidence on abuse of procurement mechanisms may have a negative impact on SOEs' expenditure from R&D budgets.¹⁴ The commitment from the President in the 2018 State of the Nation Address to strengthen regulations governing the appointment and the role of board appointees in procurement processes is an encouraging development in this regard.¹⁵

Conclusion

SOEs as potential drivers of innovation

SOEs should be able to perform at double the 2014/15 levels of 15.2% of business sector R&D expenditure in the future. There appears to have been a decline in the more strategic type of research, which should be balanced with research necessary for ongoing efficiency. Also, it is vital to understand which areas of expertise are the ones that can be filled by capable local technicians or by capacitating the same,

rather than searching overseas at great expense of time and money to get the job done. All of these issues suggest that there is much capacity for SOEs to become the nexus of knowledge capability and technological growth provided that the long-term strategic planning for such transformation is in place, and well implemented. Key to these considerations is a focus on capability growth and increased levels of funding in strategic areas. However, any additional sources of funding from public sources must be accompanied by improved mechanisms to ensure governance towards strategic ends.

Recommendations

1. The support for R&D projects in SOEs need to continue.
2. The DST and the Department of Public Enterprises (and other departments with oversight of key SOEs) must establish a framework aimed at promoting the growth of both applied research and experimental development within SOEs, at an individual level of engagement with key SOEs. Both long-term strategic capability growth and shorter-term operational efficiency gains need to be targeted.
3. Performance indicators in shareholder compacts must be extended to reflect an emphasis on R&D at SOEs to a greater extent, in line with international benchmarks. The DST needs to assist other government departments in the development of such indicators.
4. In-depth study on a case by case basis by researchers, as well as broader quantitative data on R&D funding flows, activity levels, technology acquisition and transfer are needed to provide comprehensive information on the efficient functioning of SOEs.

Acknowledgements

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Endnotes

- 1 The Presidency (2015) President Jacob Zuma: State of The Nation Address 2015. Pretoria: The Presidency, Republic of South Africa. Retrieved from <http://www.gov.za/president-jacob-zuma-state-nation-address-2015>
- 2 Kowalski P, Büge M, Sztajerowska M & Egeland, M (2013) *State-owned enterprises: Trade effects and policy implications*. Trade committee, trade and agricultural directorate. Paris: OECD. Retrieved from [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/TC/WP\(2012\)10/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/TC/WP(2012)10/FINAL&docLanguage=En)
- 3 The Presidency (2013) *Presidential review committee on state-owned entities Volume 1, Executive summary*. Pretoria: The Presidency, Republic of South Africa. Retrieved from <http://pmg-assets.s3-website-eu-west-1.amazonaws.com/140709presidential.pdf>
- 4 Balbuena SS (2014) *State-owned enterprises in Southern Africa: A stocktaking of reforms and challenges*. OECD Corporate Governance Working Papers, No. 13. Paris: OECD. Retrieved from <http://dx.doi.org/10.1787/5jzb5zntk5r8-en>
- 5 World Bank (2016) *Doing business 2016: Measuring regulatory quality and efficiency*. Washington, DC: World Bank. doi:10.1596/978-1-4648-0667-4.

- 6 PwC (2015) *State-owned enterprises: Catalysts for public value creation?* Pretoria: PriceWaterhouseCoopers. Retrieved from <https://www.pwc.com/gx/en/psrc/publications/assets/pwc-state-owned-enterprise-psrc.pdf>.
- 7 CeSTII (2017) Centre for science, technology and innovation indicators. *Research and development trends in state-owned enterprises*. Pretoria: HSRC. Data obtained from that report was updated with the most recent available data.
- 8 CeSTII (2017) *South African national survey of research and experimental development (Statistical report: 2014/15)*. Pretoria: DST.
- 9 OECD (2017) Researchers (indicator). doi:10.1787/20ddfb0f-en.
- 10 The R&D Survey design excludes companies that only perform extramural, i.e. "outsourced", R&D
- 11 CeSTII (2017) R&D Survey database (unpublished). For data requests cestiidata@hsrc.ac.za.
- 12 OECD (2015, July) OECD better policies series: South Africa Policy Brief. *Corporate governance: State-owned enterprise reform*. Paris: OECD. Retrieved from <https://www.oecd.org/corporate/south-africa-state-owned-enterprise-reform.pdf>.
- 13 Ncayiyana DJ (2012) Preventing fraud and corruption in social services: Context, progress and lessons from South Africa. Retrieved from <https://www.wits.ac.za/media/news-migration/files/Presentation%20Prof%20Dan%20Ncayiyana%20PREVENTING%20CORRUPTION%20IN%20SOCIAL%20SERVICES%20revised.pdf>.
- 14 Bhorat H, Buthelezi M, Chipkin I, Duma S, Mondli L, Peter C, Mzukisi Q, Swilling M & Friedenstien H (2017) *Betrayal of the promise: How South Africa is being stolen*. (M. Swilling, Compiler). South Africa: State Capacity Research Project, May 2017. Retrieved from <http://pari.org.za/wp-content/uploads/2017/05/Betrayal-of-the-Promise-25052017.pdf>.
- 15 The Presidency (2018) President Cyril Ramaphosa: State of the nation address 2018. Pretoria: The Presidency, Republic of South Africa. Retrieved from <http://www.thepresidency.gov.za/speeches/state-nation-address-president-republic-south-africa%2C-mr-cyril-ramaphosa>.

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