The state of innovation in South Africa: Findings from the South African National Innovation Survey

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In order to be competitive in the global economy, it is critical for organisations, industries and countries to innovate. Firms need to be aware of, and be able to respond quickly to the needs of their customers, and they should be able to use technological, social and other changes to their advantage.[1] Innovation is invariably identified as the key driver of long-term economic growth, competitiveness and a better quality of life. The importance attached to innovation is evident in the Innovation Strategy of the Organisation for Economic Co-operation and Development,[2] the focus of the European Commission on Innovation and the 'Innovation Union'[3] and South Africa's own 10-year plan 'Innovation towards a knowledge-based economy'.[4]

Innovation in the private sector occurs within individual enterprises and sometimes as a collaborative effort between enterprises. The process of producing an innovation usually comprises strategic activities that firms do not readily wish to disclose to third parties, particularly competitors. However, governments are generally aware of the benefits of innovation to the economy and seek to better understand the innovative dynamics in firms so that they can provide appropriate support measures to stimulate and encourage further innovation in order to increase the productivity and competitiveness of the business sector. One way to gain insight into these important activities in the private sector is through the implementation of an innovation survey such as that carried out in the European Union through the Community Innovation Survey. In South Africa, the Department of Science and Technology commissioned the Centre for Science, Technology and Innovation Indicators to undertake a series of national innovation surveys. In this paper we report on selected findings from the second official South African Innovation Survey for the period 2005–2007.[5]

Through the implementation of innovation, enterprises anticipate increased sales from the production of new products, processes and services and the development of new industries. These new introductions are expected to lead to the creation of employment opportunities. Furthermore, there is a wealth of evidence in the academic literature that indicates a positive relationship between innovation and firm performance and growth (in both the services and manufacturing sectors) which may lead to increased competitiveness.[6,7] It is also expected that innovative firms are likely to be more export-oriented than their non-innovative counterparts.[8]

Whereas some innovation is directly based on the results of the performance of R&D, much innovation by the enterprises concerned is based on non-R&D activities.[8] These non-R&D activities include the acquisition of external knowledge or new equipment and machinery, new market activities and design. R&D activities are best measured through dedicated R&D surveys and the differences between innovation and R&D surveys are outlined in Table 1.

The Organisation for Economic Co-operation and Development's *Oslo manual* defines an innovation as the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.[9] Four categories of innovation can be distinguished: product, process, organisational and marketing innovations. Here we primarily deal with product and process innovation. A product innovation is the introduction (to the market) of a good or service that is new or significantly improved with respect to its characteristics or intended uses. Process innovation is defined as the implementation of a new or significantly improved production or delivery method.[9]

There are four broad levels of novelty of innovations that are defined in relation to the firm and the market. In levels of increasing novelty, these are, (1) innovations that are new only to the firm, (2) innovations that are new to the market of the firm (and its competitors), (3) innovations that are new to the country and (4) innovations that are a world first.

The methodology employed for the South African Innovation Survey 2008 followed the standard practice recommended by Eurostat for the Community Innovation Survey undertaken in all European Union countries. An initial stratified random sample of 4000 enterprises (by industrial sub-sector and size of enterprise) with appropriate weights for the mining, manufacturing and services sectors was obtained from the official business register of Statistics South Africa. After

'cleaning' the sample, the remaining entries in the database comprised 2836 enterprises, weighted to statistically represent a total population of 22 849 enterprises. Following the field work to target enterprises, which involved two rounds of postal surveys, email follow-ups and two phone call reminders, the realised sample comprised a total of 757 completed and returned questionnaires, which gave an overall response rate of 26.7% based on the final sample of 2836 enterprises.

From the South African Innovation Survey 2008 (covering the years 2005–2007) a total of 65.4% of enterprises engaged in innovation activities, while 34.6% of enterprises reported no innovation activities (Figure 1). Successful innovations (where innovative products were introduced to the market or innovative processes were implemented within the enterprise) were recorded by 27.2% of enterprises. Successful innovators consisted of product only innovators (8.9%), process only innovators (10.3%) and innovators with both product and process innovations (7.9%). Unsuccessful innovators (38.2% of enterprises) reported that they had only abandoned and/or ongoing innovation activities. Of these enterprises, a mere 1% reported only abandoned innovations and a further 3.5% had both abandoned and ongoing innovation activities, leaving a total of 33.7% of enterprises with only ongoing innovation activities.

South African enterprises spent the equivalent of 1.7% of their turnover on innovation activities in 2007. Their total expenditure on innovation activities was nearly R57 billion, of which R12.1 billion (or 21.2%) was spent on in-house R&D activities (Table 2). A further R6.4 billion was spent on outsourced R&D, which comprised R&D carried out by other enterprises on contract or as part of an agreement, the results of which will most likely be incorporated into new innovative products or processes by the contracting firm. The bulk of innovation expenditure (R33.9 billion or 59.5% of the total innovation expenditure) was spent on the acquisition of machinery, equipment and software. A further R4.5 billion (or 7.8% of the total innovation expenditure) was spent on the acquisition of other external knowledge, such as licenses or technical know-how. Service-based industries spent more than industrial enterprises on extramural or outsourced R&D and the acquisition of other external knowledge, indicating that they may have less internal resources for innovation activities than do industrial enterprises. Service-based enterprises spent R5.3 billion on intramural R&D compared to the R6.7 billion spent by industrial enterprises; both these figures represent substantial investments in developing new internal knowledge for the enterprises concerned. Innovation expenditure was only reported for the 2007 financial year and the finding that the majority of expenditure was on ongoing innovation activities indicates that most innovations take more than a year to develop – this time dimension is an important consideration for policymakers and deserves greater research focus.

A question additional to the Community Innovation Survey was included in the South African Innovation Survey 2008, namely were the innovations new to the world or new to South Africa? Out of a total of 14 934 innovative enterprises, 4.4% of these reported innovations that were not only new to the market but also new to the world, while 23.1% indicated that their innovations were new to the market and new to South Africa (Figure 2). In addition, 18.2% of enterprises indicated that their innovations were new to the firm and also a South African first, while 3.7% of enterprises claimed that they introduced innovations that were both new to the firm and a world first. However, it should be noted here that these 'new-to-the-world' and 'new-to-South-Africa' innovations were as reported by respondents, and, because of the nature of the innovation survey, have not been subjected to further validation.

Innovations are clearly important to the bottom line of enterprises. Respondents were asked to report the percentage of turnover accounted for by innovations that were new to the market or new to the firm or products that were unchanged or marginally modified. The bulk of the turnover (85% or R2100 billion) was attributed to these marginally modified or unchanged products (Figure 3). New-to-the-market innovations accounted for 8.5% of the turnover or R209.5 billion, while innovations that were new to the firm provided 6.5% of turnover (or R160.5 billion).

TABLE 1: Differences between R&D surveys and innovation surveys.

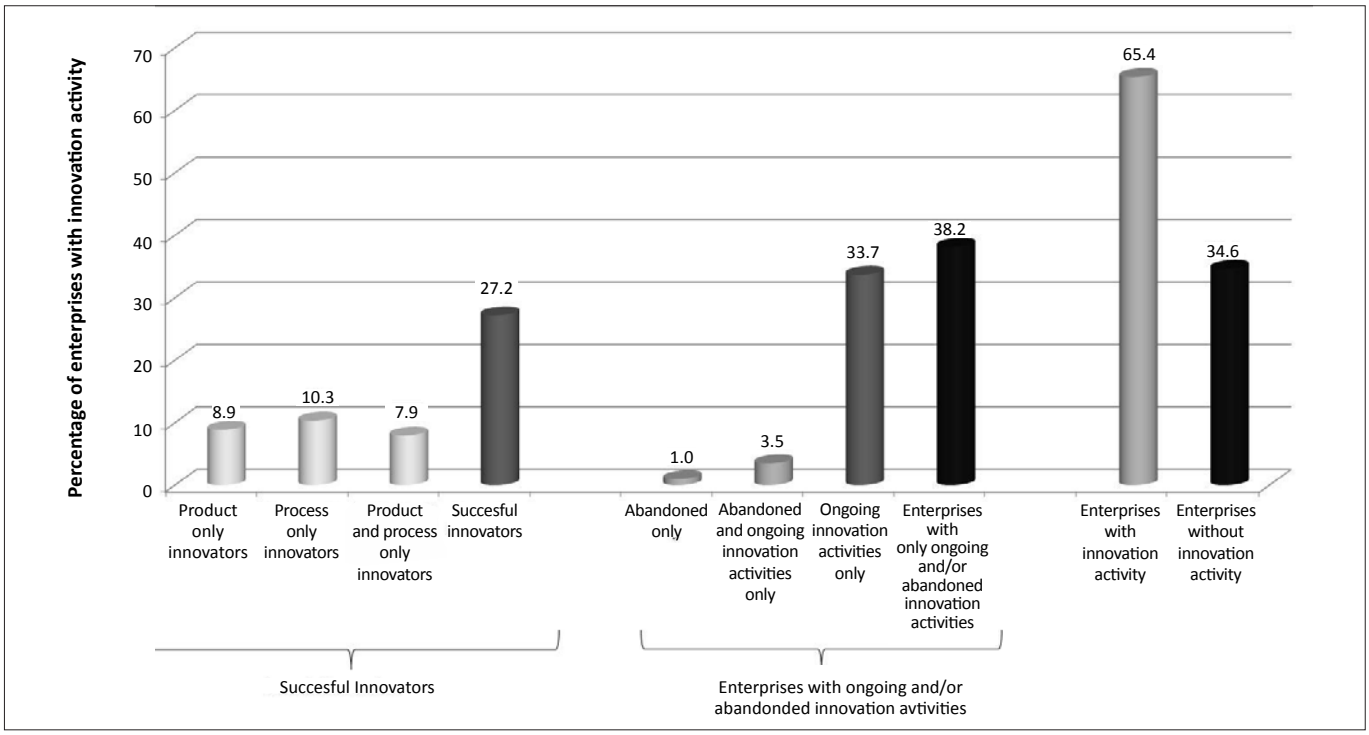
R&D surveys	Innovation surveys
Based on the OECD guidelines in the *Frascati manual* (2002); no recommended questionnaire template	Based on the OECD and Eurostat guidelines in the *Oslo manual* (2005) and the Community Innovation Survey questionnaire template
Purposive survey aims to cover all R&D performers in all economic sectors	Stratified, random sample of business enterprises from selected sectors
Results comprise a census of R&D performers (sometimes estimates are made)	Results are extrapolated to represent the business population
Results provide an international benchmark (R&D as % GDP) as well as policy inputs	Results are used for international comparisons and provide inputs for policy
R&D is well understood and surveys are fairly standard	Innovation is poorly understood and innovation surveys are still evolving

OECD, Organisation for Economic Co-operation and Development.

TABLE 2: Innovation expenditure (R million) by type of innovation, 2007.

Expenditure (R million)	Enterprises with innovation activity	Product only innovators	Process only innovators	Product and process innovators	Enterprises with only ongoing or abandoned activities
Total expenditure	56 958	1768	1316	9219	44 656
In-house R&D	12 097	263	47	469	11 318
Outsourced R&D	6479	268	142	46	6023
Acquisition of machinery, equipment and software	33 920	806	1114	7814	24 187
Acquisition of other external knowledge	4461	431	13	890	3127

Source: Data derived from the Innovation Survey 2008 database.

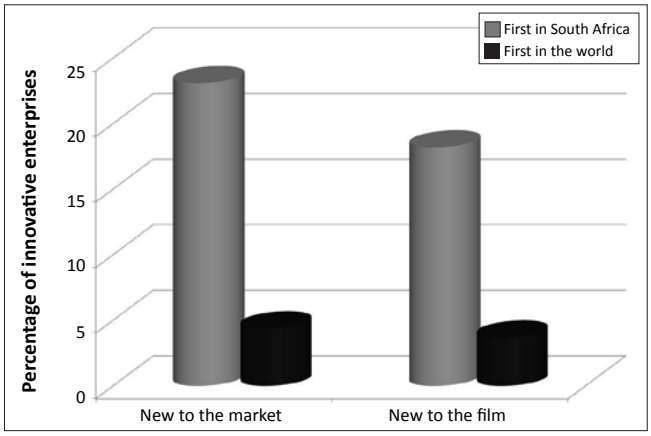


Source: Data derived from Moses et al.[5]

FIGURE 1: Innovation rate of South African enterprises by type of innovation activity, 2005–2007.

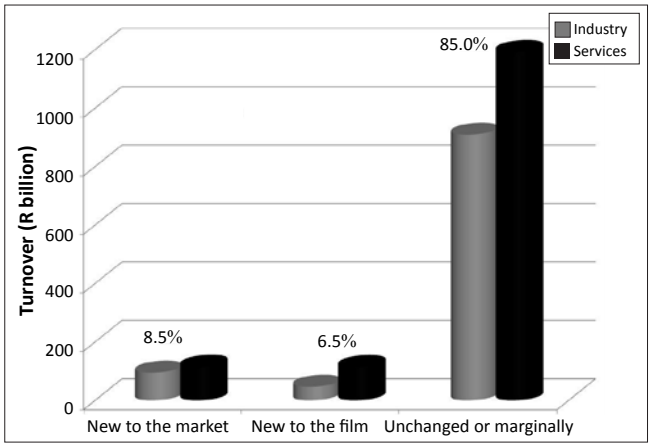
Considering that the total innovation expenditure in 2007, as claimed by enterprises, was R57 billion, these figures indicate that the return on innovation is worthwhile – in this case a total turnover of R370 billion. However, it is important to note that different time periods for innovation expenditure and turnover from new products are recorded in snapshot innovation surveys.

Not only are innovations important for the viability and profitability of enterprises, but they also have valuable beneficial outcomes or effects for innovative firms. The most important outcome of innovations for enterprises was an increase in the range of goods or services introduced to the market and 31.2% of enterprises indicated this result as an outcome of innovation activities (Figure 4). The second most important outcome of innovations was the improved quality of goods or services as reported by 30.7% of enterprises. The third most important effect was increased capacity of production or service provision and 25.6% of enterprises indicated that this outcome was highly important, while 17.0% reported that entry into new markets or improved market share were highly important effects of innovation. These important effects of innovation are all vital aspects of business enterprises' competitiveness in local and global markets. Surprisingly, relatively few enterprises indicated that reduced labour costs per unit output (8.9%) were a highly important effect of innovation; and reducing environmental impacts or improved health and safety was only regarded as highly important by 6.3% of enterprises. While this profile is a South African one identified through the Innovation Survey 2008, it is very similar to that of the previous South African survey of 2005 and to results provided by most other countries.



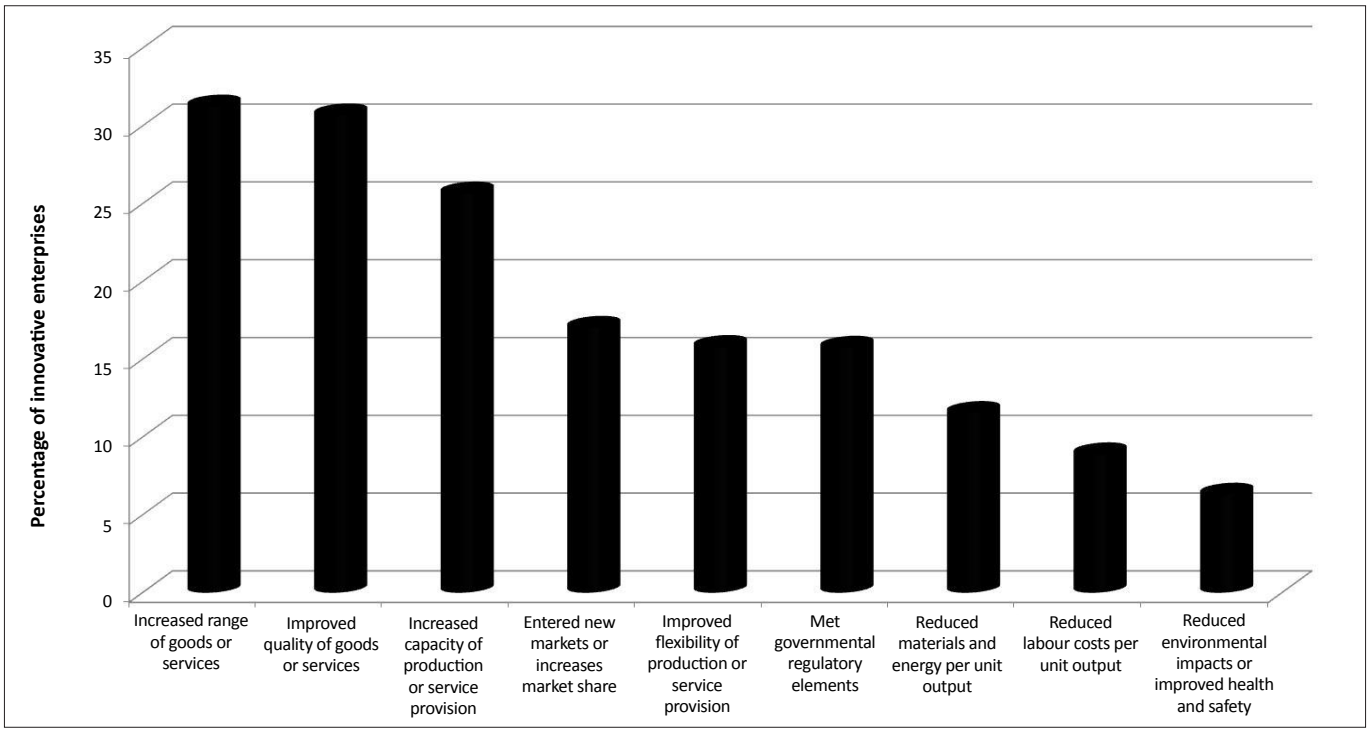
Source: Data derived from Moses et al.[5]

FIGURE 2: Percentage of innovative firms with new-to–the-market or new-to-the-firm innovations that were a first in South Africa or the world.



Source: Moses et al.[11]

FIGURE 3: Breakdown of turnover (in billion Rands) in 2007 of product (goods and services) innovators, by product type.



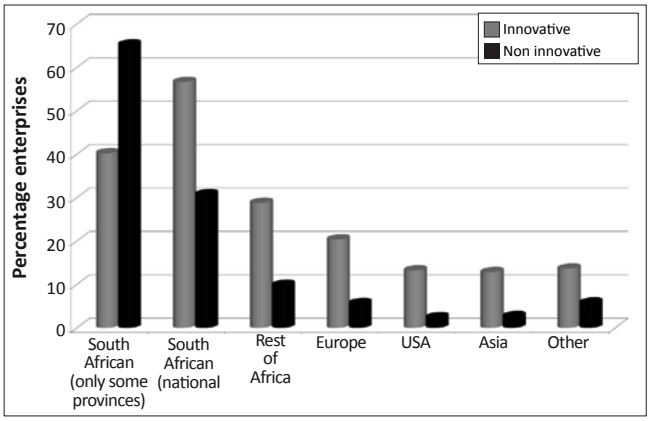
Source: Moses et al.[11]

FIGURE 4: Outcomes of innovation considered to be highly important to enterprises, 2005–2007.

A further important competitive advantage to innovative enterprises is that innovative enterprises tend to be more export-orientated than are non-innovative enterprises. Non-innovative enterprises were more likely to distribute their goods and services in only some South African provinces (65.3%) compared to innovative enterprises (40.2%). More than half (56.6%) of innovative enterprises indicated that they sold their goods and services to the broader national South African market, whereas only 30.8% of non-innovative enterprises did so (Figure 5). In terms of foreign markets, 28.8% of innovative enterprises reported selling goods and services in the rest of Africa while only 9.9% of non-innovative firms did so. Markets in Europe were the target of 20.4% of innovative enterprises while only 5.7% of non-innovative enterprises appeared to actively sell goods and services in Europe. Similarly, 13.2% of innovative enterprises distributed goods and services in the USA, while 2.4% of non-innovative enterprises were active in the USA market and 12.8% of innovative enterprises served markets in Asia, while only 2.7% of non-innovative enterprises exported to Asia.

A further notable finding from the Innovation Survey 2008 was that enterprises with innovation activities tended to be the largest employers. Both innovative service and industrial enterprises employed more than 90% of the employees reported for all enterprises. Thus, while there were 14 934 innovative enterprises and 7915 non-innovative enterprises, the innovative enterprises employed 3.3 million employees while the non-innovative enterprises employed only about 0.27 million employees, indicating that innovation tends to create employment (Table 3).

A relatively high proportion of firms may be involved in innovation activities such as R&D, which may lead to high innovation in a country, but the more important indicator is



Source: Moses et al.[11]

FIGURE 5: Geographic distribution of goods and services sold by innovative and non-innovative South African enterprises, 2005–2007.

TABLE 3: Number and percentage of employees in South African enterprises, 2007.

South African enterprises	Industry		Services		Total	
	Number of employees	(%) Sector	Number of employees	(%) Sector	Number of employees	(%)
Enterprises with innovation activity	1 574 340	90.8	1 785 839	93.8	3 249 997	92.3
Enterprises without innovation activity	160 429	9.2	1 675 657	6.2	270 611	7.7
All enterprises	1 734 769	100	110 182	100	3 520 608	100

Source: Data derived from Moses et al.[5]

the rate of successful introductions of innovative products or processes to the market, which may be rather lower. For example, in South Africa, the Innovation Survey 2008 showed that while 65.4% of enterprises engaged in innovation activities, only 27.2% of enterprises created innovations that were successfully introduced to the market during the 3 years from 2005 to 2007. In Ireland, 47.2% of enterprises were recorded as actively innovative during 2004 to 2006, while 2% of enterprises reported only ongoing or abandoned innovation activities[10], much less than the 38.2% reported for South Africa. The relatively high rate of only ongoing or abandoned innovation activities in South Africa may be more prevalent in certain sectors than in others and warrants further investigation.

The South African Innovation Survey 2008 has shown that South African enterprises have a fairly high innovation rate and that the degree of novelty of South African innovations is also relatively high. Policymakers in South Africa should take note of these positive results and ensure that the policy and infrastructure environment actively supports innovation activities in the productive sectors of the economy.

Acknowledgements

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