

AUGUST 2013

National Survey of Research  
and Experimental Development  
(2010/11 Fiscal Year)

**Main Results 2010/11**



**science  
& technology**

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA



**HSRC**  
Human Sciences  
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We are also most grateful for and acknowledge the co-operation of the respondents to the questionnaire.

The CeSTII project team for the 2010/11 R&D survey comprised (in alphabetical order): Thomson Batidzirai, William Blankley, Irma Booyens, Demetre Labadarios, Vaughan Leiberum, Bonelwa Mabovu, Hlamulo Makelane, Neo Molotja, Nazeem Mustapha, Nolitha Nkobole, Saahier Parker, Madalitso Phiri, Guia Ritacco, Julien Rumbelow, Natasha Saunders, Moses Sithole and Natalie Vlotman.

# FOREWORD

The Statistics Act (No. 6 of 1999) requires of the SG to coordinate statistical production beyond the confines of Statistics South Africa (Stats SA). The Department of Science and Technology (DST) has fully supported this intent, producing on an annual basis the National Survey of Research and Experimental Development (R&D Survey). As such, the DST has become a model for the type of functional and activity based relationship required to assist other partners of the National Statistics System (NSS) in contributing to the body of official statistics.

In recognising this role, DST has agreed to subject the R&D Survey to an ongoing statistical quality assessment as gazetted through South Africa Statistical Quality Assessment Framework (SASQAF) to ensure that the survey remains credible in meeting the user needs; in informing planning and decision making; and in monitoring the implementation of government programmes and policies.

Working with the Director General of the DST and supported by the Centre for Science Technology and Innovation Indicators (CeSTII) of the HSRC, we adopted a quality Management Plan for this survey and establish a Clearance Committee that reviews each round of the survey and advise whether the quality management principles have been adhered to before the results can be released.

The quality concerns that were noted in the 2009/10 survey were resolved to an extent in the 2010/11 survey as there were noticeable improvements in coverage and documentation of process metadata. However there is still need to improve the coverage further and Stats SA, DST and CeSTII continue to work together in resolving quality concerns.



Given my assessment and the visible commitment demonstrated by the DST in implementing the quality improvement initiatives, I endorse the 2010/11 R&D Survey results and encourage its use by stakeholders.

A handwritten signature in black ink, appearing to read 'Pali J. Lehohla'.

**Pali J Lehohla**  
**Statistician-General**  
**Republic of South Africa**

# PREFACE

The National Survey of Research and Experimental Development (R&D) is undertaken annually to monitor the country's investments in R&D. The survey provides information on R&D funding and performance in South Africa. The data help to profile the size and shape of the R&D landscape and support the production of statistics for use in system-level planning, monitoring and evaluation.

The 2010/11 R&D survey recorded that South Africa spent R20.254 billion as gross expenditure on research and development (GERD), a nominal decrease of 3.3% from the R20.254 billion recorded for 2009/10. With the GERD as a percentage of Gross Domestic Product (GDP) at 0.76%, the findings indicate a fourth consecutive decline from 0.93% of 2007/08, 0.92% of 2008/09 and 0.87% in 2009/10. These declines are occurring in an environment of modest increases in GDP.

The trends show that the government's funding for R&D has been increasing consistently; and from 2007 its contribution towards funding surpassed that of the business sector. This is an important development because the government has continued to increase funding for R&D despite the pressures on the fiscus during the period from 2008 to 2010. This has resulted in some shifts, where the higher education and science councils sectors have both increased their contribution to overall spending on R&D compared to the situation in the mid-2000s. By investing in these sectors, the government is able to boost the capacity for new knowledge creation and drive strategic research initiatives that have specific outcomes for development. This includes, for example, the advances in health research, particularly on HIV/AIDS vaccines and cancer treatment, the five pilot plants to test feasibility for mineral beneficiation processes and technologies, and the hydrogen and fuel cell technology programmes.

On the other hand, the business sector remains the largest performer of R&D, with 49.7% of GERD. The decline of 9.7% in the R&D expenditure in this sector is, therefore, of concern as it has direct implications for industrial innovation and economic competitiveness.

The current efforts to boost the human resource base for science, engineering and technology, and recapitalise and build the public scientific facilities are important in creating attractive conditions and incentives and encouraging private sector and international R&D investment. The new



amendments to the R&D tax incentives and the recent establishment of the Technology Innovation Agency are some of the specific measures to encourage business sector R&D and innovation.

Globally there has been a slow growth in R&D spending between 2008 and 2010, which is a similar trend observed with South Africa. Recent statistics show that some countries have turned the corner and are starting to increase their R&D spending.

We extend our appreciation to the CeSTII project team for their efforts in conducting this survey each year, and the support of Statistics South Africa in recommending and monitoring of the use of statistically sound methodology to ensure that the survey continuously produces quality statistics.

A special word of thanks goes to all the survey respondents, in the higher education sector, science councils, not-for-profit sector, government sector and the business sector, who gave their time so readily to make this survey a success.

**Derek Hanekom, MP**  
**Minister of Science and Technology**



# LIST OF ABBREVIATIONS

<b>AIDS</b>	Acquired immune deficiency syndrome
<b>AU</b>	African Union
<b>BERD</b>	Business Expenditure on R&D
<b>BRIC countries</b>	Brazil, Russia, India and China
<b>CEO</b>	Chief executive officer
<b>CeSTII</b>	Centre for Science, Technology and Innovation Indicators
<b>DACST</b>	Department of Arts, Culture, Science and Technology (until 2002)
<b>DST</b>	Department of Science and Technology (since 2002)
<b>FTE</b>	Full-time equivalent
<b>GDP</b>	Gross domestic product
<b>GERD</b>	Gross domestic expenditure on R&D
<b>GUF</b>	General University Fund
<b>HIV</b>	Human immunovirus
<b>HSRC</b>	Human Sciences Research Council
<b>ICT</b>	Information and Communication Technology
<b>M</b>	Male
<b>NEPAD</b>	New Partnership for Africa's Development
<b>NESTI</b>	National Experts on Science and Technology Indicators
<b>NPC</b>	National Planning Commission
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PPP</b>	Purchasing power parity
<b>R</b>	Rand (South African currency)
<b>R&amp;D</b>	Research and experimental development
<b>SA</b>	South Africa
<b>SIC</b>	Standard industrial classification
<b>Stats SA</b>	Statistics South Africa
<b>TB</b>	Tuberculosis
<b>UIS</b>	UNESCO Institute for Statistics
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation

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# EXECUTIVE SUMMARY

The National Survey of Research and Experimental Development presents statistics on the funding and performance of research and experimental development (R&D) in five sectors, namely, government, science councils, higher education, business and not-for-profit organisations. The survey collects data on expenditures and personnel devoted to R&D. The survey is a regular feature in the South Africa policy landscape.

South Africa's gross domestic expenditure on R&D (GERD), in current values, amounted to R20.254 billion in 2010/11. This represents a decline of R701 million (-3.3%) in current Rand values from the R20.955 billion recorded in 2009/10. At constant 2005 Rand values, GERD amounted to R13.945 billion in 2010/11. This represents a decline of R1.654 billion (-10.6%) at constant 2005 Rand values from the R15.599 billion recorded in 2009/10. The 2010/11 R&D survey registered a second consecutive year of decline in GERD following a decade and a half of real increases.

The R&D survey recorded GERD as percentage of gross domestic product (GDP) at 0.76% in 2010/11, decreasing from 0.87% recorded in 2009/10. This indicator has been tapering off from the peak of 0.95% reached in 2006/07 (to 0.93% in 2007/08, 0.92% in 2008/09 and 0.87% in 2009/10) and is drifting away from the preferred national and global benchmarks. These declines are occurring in an environment of modest increases in GDP.

Although the business sector remains the largest performer as opposed to funder of R&D in South Africa, it accounts for most of the decline in GERD since 2007/08. The proportional contribution of the business sector to GERD fell to 49.7% from the average of 56.3% recorded between 2006/07 and 2009/10. Substantial declines in R&D spending were specifically observed in the manufacturing sector, financial and business services, as well as electricity, gas and water supply. R&D expenditure in electricity, gas and water supply decreased to a level more than four times lower than the level achieved in 2008/09. R&D in the chemical and plastic industries within the manufacturing sector declined over the three-year period between 2008/09 and 2010/11. The increases in R&D expenditure of 6.3% and 4.0% from 2009/10 in the higher education and science councils sectors respectively have not been sufficient to sustain the overall growth in GERD.

Globally, R&D spending slowed down in the period between 2009 and 2010, following years of steady increases. South Africa has seen a similar trend. The majority of the advanced economies have, however, turned the corner and increased their R&D spending. Some emerging economies, such as China, India, Korea and several East Asian economies, have sustained above-average increases in R&D expenditure throughout the period of the economic crisis, and continue to define the shifting map of global R&D spending. South Africa does not seem to have captured similar magnitudes of R&D activity as its emerging-economy peers.

The R&D personnel headcount averaged approximately 53 400 for the period 2006/07 to 2010/11. The 6.7% decrease in R&D personnel from 59 494 in 2009/10 to 55 531 in 2010/11 appears significant given that the supply of researchers has been a key constraint to increasing R&D investment in South Africa. Of the total R&D personnel in 2010/11, 37 901 (68.3%) were researchers and the rest were technicians and other personnel directly supporting R&D performance. There were 1.4 full-time equivalent (FTE) researchers per 1 000 in total employment in 2010/11.

The government and business sectors funded most of the R&D expenditure in 2010/11; the government funded 44.5% and the business sector 40.1%. The data show the continuing shifts in the sources of funds for R&D, with the business sector funding 8.7% less GERD in 2010/11 than in the previous year. The percentage of R&D funding from international sources remained unchanged at an average contribution of 12% of total R&D funding over the past six years, even though the amount of R&D funding from foreign sources declined by 3.7% to R2.4 billion in 2010/11.

# INTRODUCTION

This report presents the main results of the 2010/11 National Survey of Research and Experimental Development. The report is published together with a separate Statistical Report that presents the statistical tables and the survey methodology.

The R&D survey is commissioned by the Department of Science and Technology (DST) as part of the statistical series to monitor the performance of the National System of Innovation (NSI). The 2010/11 survey is the ninth R&D survey that has been conducted by the Centre for Science Technology and Innovation Indicators (CeSTII) at the Human Sciences Research Council (HSRC). The survey is compiled according to the international guidelines proposed by the Organisation for Economic Cooperation and Development (OECD) in *“The Measurement of Scientific and Technological Activities: Proposed Standard Practice for Surveys on Research and Experimental Development”* known as the Frascati Manual (OECD 2002). The data are collected from R&D-performing entities within government departments, business enterprises, higher education institutions, science councils and not-for-profit organisations.

Trend data used in this report are sourced from the R&D survey database (South African National Survey of Research and Experimental Development, 1991/92 to 2010/11).

The main indicators tracked through this survey include:

- Gross domestic expenditure on research and development
- Flows of funding for R&D
- R&D expenditure by economic sector, field of research and socio-economic objectives
- R&D personnel by category (researchers, technicians and related skilled R&D personnel) and the time that they devote to R&D
- R&D involving local and international collaborations.

The report consists of seven chapters that provide detailed data and short analysis on these indicators, as well as international comparisons for benchmarking. The user satisfaction survey questionnaire has been added as an annexure to gather user needs and perceptions on the survey and thereby contribute to continuous improvement of the survey.

- **Chapter 1** provides an overview on monitoring R&D performance through a survey and a summary of key indicators.
- **Chapter 2** presents R&D expenditure at an aggregated level and by sector of performance.
- **Chapter 3** presents R&D expenditure by sources of funding.
- **Chapter 4** presents R&D expenditure by type of R&D performed, field of research, economic sector and other characteristics.
- **Chapter 5** presents R&D personnel and the profile of researchers in South Africa.
- **Chapter 6** analyses the geographic dimensions of R&D in the country.
- **Chapter 7** presents international comparisons.

# CHAPTER 1

## MONITORING R&D PERFORMANCE IN SOUTH AFRICA

### 1.1 The importance of R&D statistics

Investment in R&D is important to South Africa's economic growth and development. Its measurement, through the National Survey of Research and Experimental Development is therefore vitally important in monitoring the performance of the National System of Innovation. The R&D survey produces statistics that show the quantum and composition of R&D expenditure and the stock of human capital devoted to R&D, which are critical components of the national capacity for the advancement of knowledge and innovation performance.

The survey provides information that can be used in addressing a range of socio-economic issues in South Africa. Strategic policy documents such as the White Paper on Science and Technology (1996), the National Research and Development Strategy (NRDS - 2002), the Ten Year Innovation Plan for South Africa (2008-2018) and the National Development Plan (NPC 2011) make specific commitments with respect to the country's scientific and technological activities, including R&D in order to attain national goals. The measurement and monitoring of R&D is therefore also linked to other mechanisms for understanding the output of R&D and its impact on the economy and society.

The government and the policy research community use the statistics produced by the R&D survey to assess the impact of policies and to support national planning. These statistics also provide a basis for benchmarking South Africa's R&D performance against other countries.

The business sector and the international community require the statistics on R&D to evaluate potential locations for their R&D initiatives. They need this information to understand what type of R&D a country's resources are able to support and what strategic opportunities exist from which they can leverage.

## 1.2 Key indicators

The R&D survey produces a number of indicators. Key indicators are presented in Table 1.1.

**Table 1.1: Key indicators, South Africa, 2009/10 and 2010/11**

KEY INDICATOR	VALUE	
	2009/10	2010/11
Gross domestic expenditure on R&D (GERD) (Rand million)	20 955	20 254
Gross domestic product (GDP) at current prices (Rand million)	2 395 967	2 664 269
GERD as a percentage of GDP (%)	0.87	0.76
Total R&D personnel (FTE*)	30 891.3	29 486.4
Total researchers (FTE*)	19 793.1	18 719.6
Total researchers (FTE*) per 1 000 in total employment	1.5	1.4
Total R&D personnel (FTE*) per 1 000 in total employment	2.3	2.2
Total researchers (headcount)	40 797	37 901
Female researchers (headcounts) as a percentage of total researchers**	41	42

<b>DEFINITION</b>	<p>* FTE - Full-time equivalent</p> <p><b>Research and experimental development (R&amp;D)</b> is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications.</p> <p><b>Gross domestic expenditure on R&amp;D (GERD)</b> is total intramural expenditure on R&amp;D performed within the national territory during a given period.</p>
<b>DATA SOURCE</b>	<p>South African National Survey of Research and Experimental Development, 2009/10 to 2010/11.</p> <p>GDP values: Stats SA P0441: GDP, 3rd Quarter (2012)</p>
<b>DATA NOTE</b>	<p>** Following OECD practice, post-doctoral fellows and doctoral students are included as researchers</p>



# CHAPTER 2

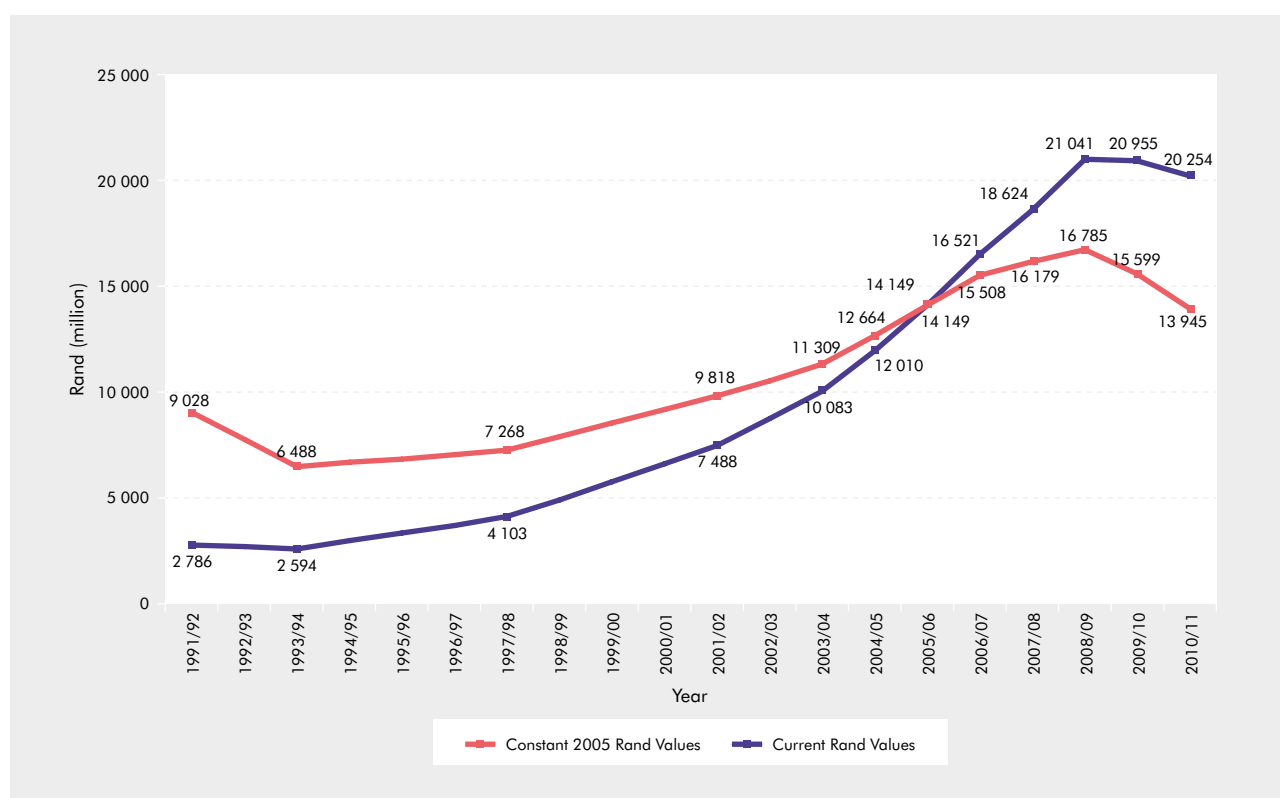
## R&D EXPENDITURE

### 2.1 Gross domestic expenditure on R&D (GERD)

Gross domestic expenditure on R&D (GERD) amounted to R20.254 billion at current Rand value (Figure 2.1). This represents a nominal decrease of 3.3% from the R20.955 billion recorded in 2009/10. At constant 2005 Rand value, GERD amounted to R13.945 billion in 2010/11.

The 2010/11 R&D survey registered a second consecutive year of decline in GERD following over a decade and a half of real increases, during which R&D expenditure increased from R2.594 billion in 1993/94 and peaked at R21.041 billion in nominal terms in 2008/09. R&D performance in the business sector accounted for most of the decline in R&D expenditure during 2009/10 and 2010/11.

**Figure 2.1: GERD in current and constant 2005 Rand values, South Africa, 1991/92 to 2010/11**



#### DEFINITIONS

**Research and experimental development (R&D)** is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications.

**Gross domestic expenditure on R&D (GERD)** is total intramural expenditure on R&D performed within the national territory during a given period.

#### DATA SOURCE

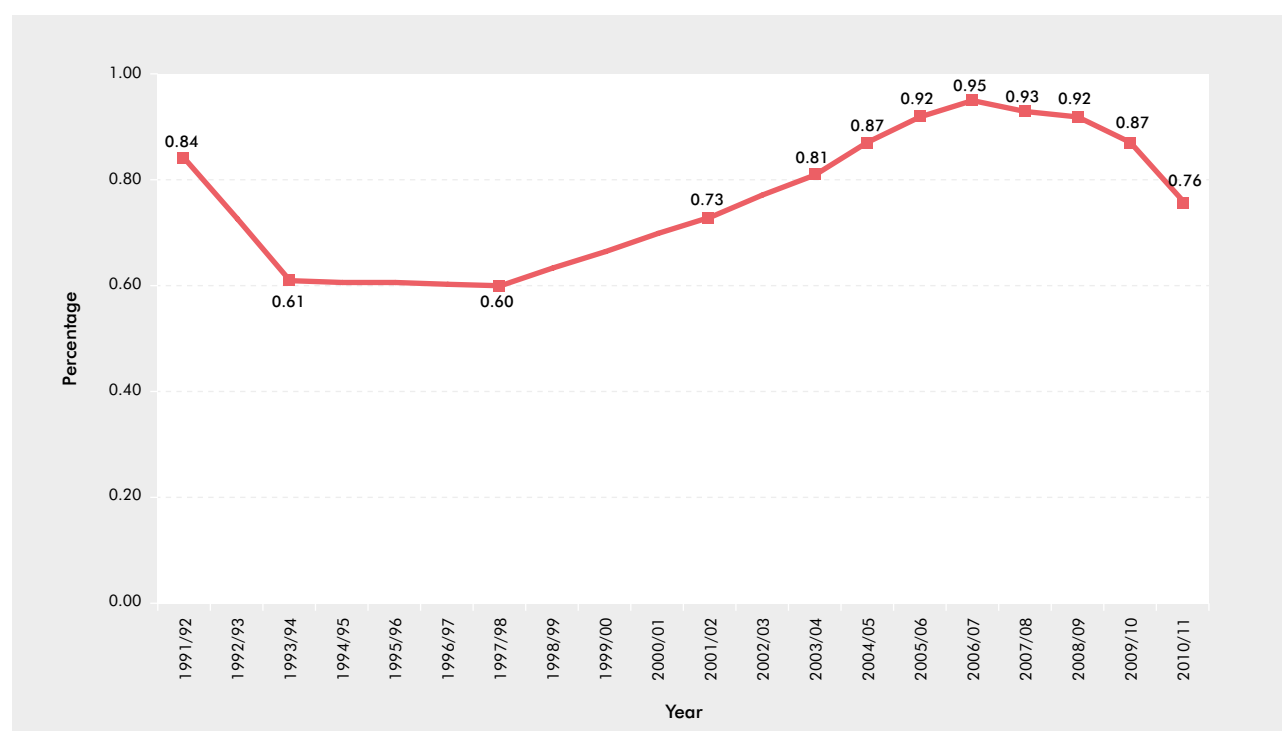
South African National Survey of Research and Experimental Development, 1991/92 to 2010/11.

## 2.2 R&D expenditure as a percentage of GDP

GERD expressed as a percentage of GDP indicates the concentration or intensity of R&D in an economy. GERD is one of the indicators used to compare countries' research efforts and competitiveness internationally. GERD as a percentage of GDP in South Africa increased from 0.60% in 1997/98 and peaked at 0.95% in 2006/07, but has declined each year since then (Figure 2.2).

GERD as a percentage of GDP was recorded at 0.76% in the 2010/11 survey, decreasing from 0.87% in 2009/10. The weakening of this indicator is occurring in an environment of modest increases in GDP.

**Figure 2.2: GERD as a percentage of GDP, South Africa, 1991/92 to 2010/11**



<b>DEFINITION</b>	GERD expressed as a percentage of GDP provides an indication of the intensity of R&D in an economy.
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 1991/92 to 2010/11. GDP values: Stats SA P0441: GDP, 3rd Quarter (2012)

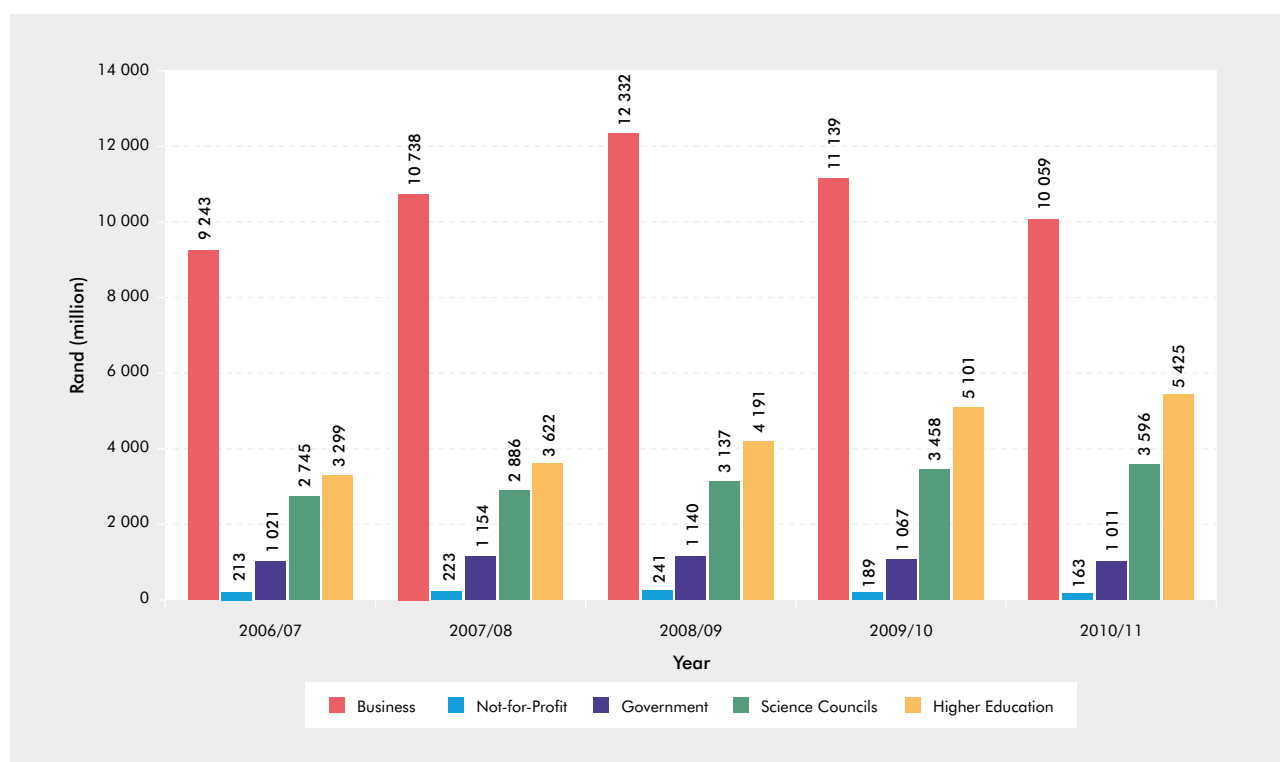
## 2.3 GERD by sector

The business sector remains the largest performer of R&D in South Africa. Business Expenditure on R&D (BERD), in current Rand values, amounted to R10.059 billion in 2010/11, which was 49.7% of GERD (Table 2.3). This amounted to R6.926 billion at constant 2005 Rand values.

R&D expenditure by higher education institutions in current Rand values grew from R3.299 billion in 2006/07 to R5.425 billion in 2010/11. At constant 2005 Rand values, this corresponds to a growth in R&D expenditure by higher education institutions from R3.097 billion in 2006/07 to R3.735 billion in 2010/11. R&D expenditure by science councils rose from R2.745 billion in 2006/07 to R3.596 billion in 2010/11, which at constant 2005 Rand values corresponds to a change from R2.577 billion in 2006/07 to R2.476 billion in 2010/11. R&D expenditure, in current Rand values, by government remained at approximately R1.021 billion over the same period, which amounts to a decrease at constant 2005 Rand values from R958 million to R696 million. Expenditure by the not-for-profit sector, in current values, peaked at R241 million in 2008/09 and decreased to R163 million in 2010/11. At constant 2005 Rand values, the expenditure by the not-for-profit sector was R192 million in 2008/09 and R112 million in 2010/11.

The higher education and science councils sectors were able to sustain and increase their R&D expenditure between 2006/07 and 2010/11 while the business sector's R&D expenditure declined between 2008/09 and 2010/11.

**Figure 2.3: R&D expenditure by sector (R million), South Africa, 2006/07 to 2010/11**



<b>DEFINITION</b>	R&D-performing sectors are defined, according to the Frascati Manual (OECD 2002), as comprising the government (including science councils and higher education), business and not-for-profit sectors. For these statistics, GERD has been broken down by sector of performance as recorded in the R&D survey.
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 2006/07 to 2010/11.

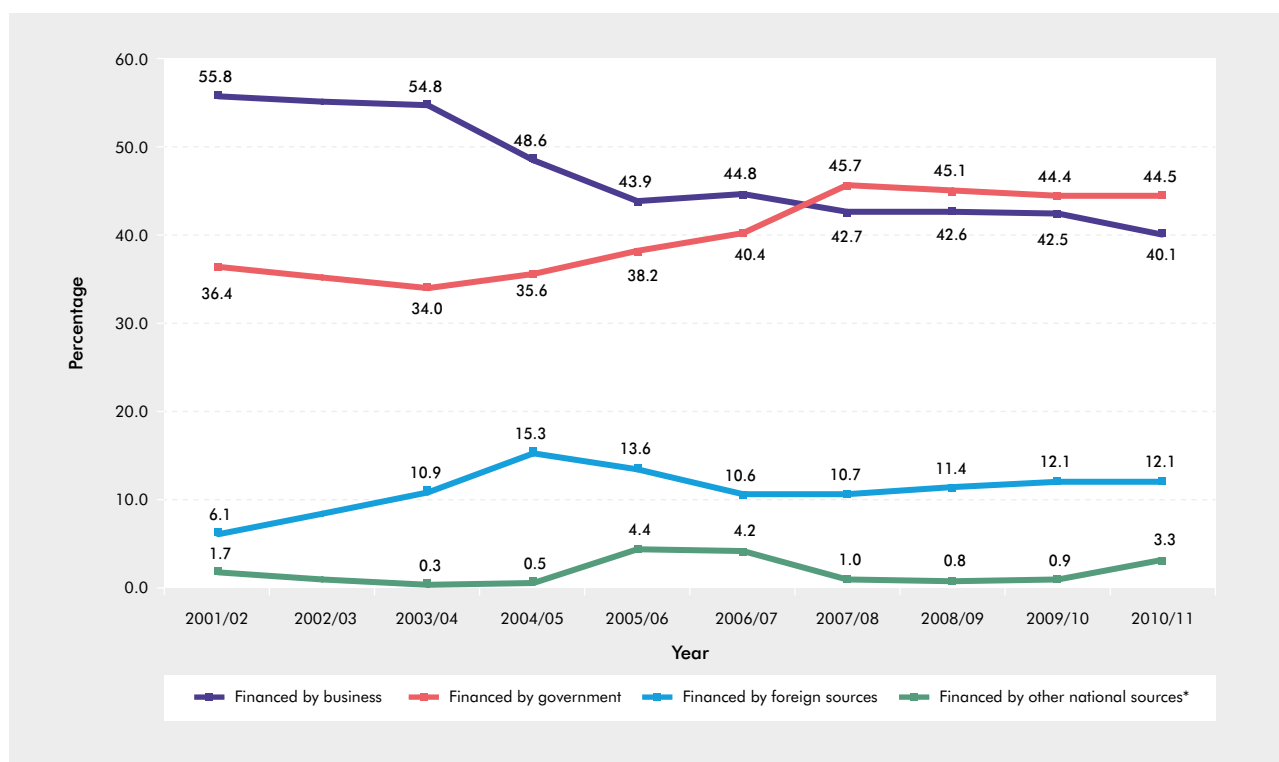
# CHAPTER 3

## FUNDING FOR R&D

### 3.1 R&D by sources of funds

Government and business enterprises funded the largest proportion of GERD in 2010/11. Government has been the largest funder of R&D since 2007/08 (Figure 3.1). In 2001/02, 55.8% of GERD was financed by the business sector, decreasing to 40.1% in 2010/11. Government financed 36.4% of GERD in 2001/02, increasing to 44.5% in 2010/11. The proportion of GERD financed from abroad increased from 6.1% in 2001/02 to 12.1% in 2010/11.

**Figure 3.1: GERD by source of funds, South Africa, 2001/02 to 2010/11**



**DATA SOURCE** National Survey of Research and Experimental Development, 2001/02 to 2010/11.

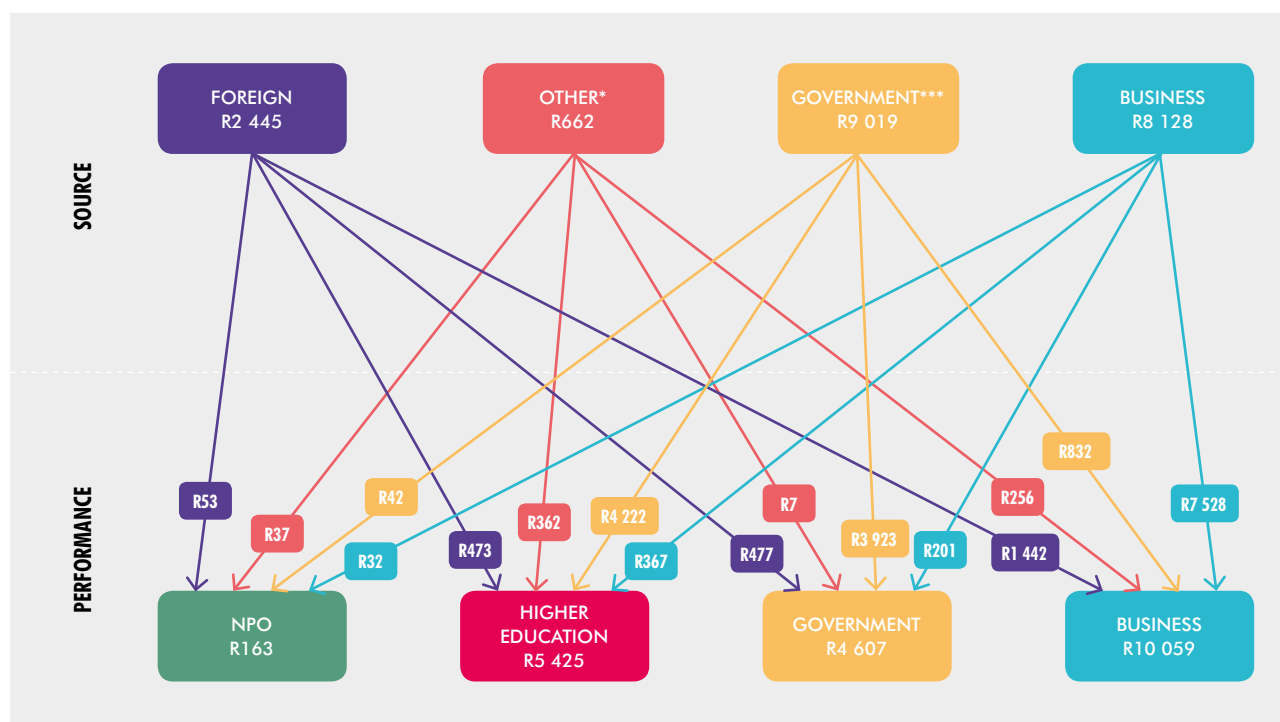
**DATA NOTE** \*Other national sources includes higher education, not-for-profit and individual donations

### 3.2 Major flows of funding in South Africa

The business sector was the largest performer of R&D in South Africa in 2010/11. It funded 74.8% (R7.528 billion) of its R&D from its own sources. This sector attracted funding worth R1.442 billion from foreign sources in 2010/11, a large part of which was from parent companies of local subsidiaries. The contribution of government towards R&D in the business sector amounted to 8.3% of expenditure in 2010/11 (totalling R832 million).

The bulk of the R&D funded by government was undertaken by the higher education institutions and science councils. Higher education institutions received R4.222 billion (which was 77.8% of their R&D funding) from government in 2010/11, while science councils received R2.932 billion (which was 81.5% of their R&D funding) from government in the same year.

Figure 3.2: Major flows of R&amp;D funding (million), South Africa, 2010/11



**DATA SOURCE** National Survey of Research and Experimental Development, 2010/11.

**DATA NOTE** \*Other includes contributions from higher education, not-for-profit organisations and individual donations

\*\*Government includes science councils

### 3.3 Business-funded R&D

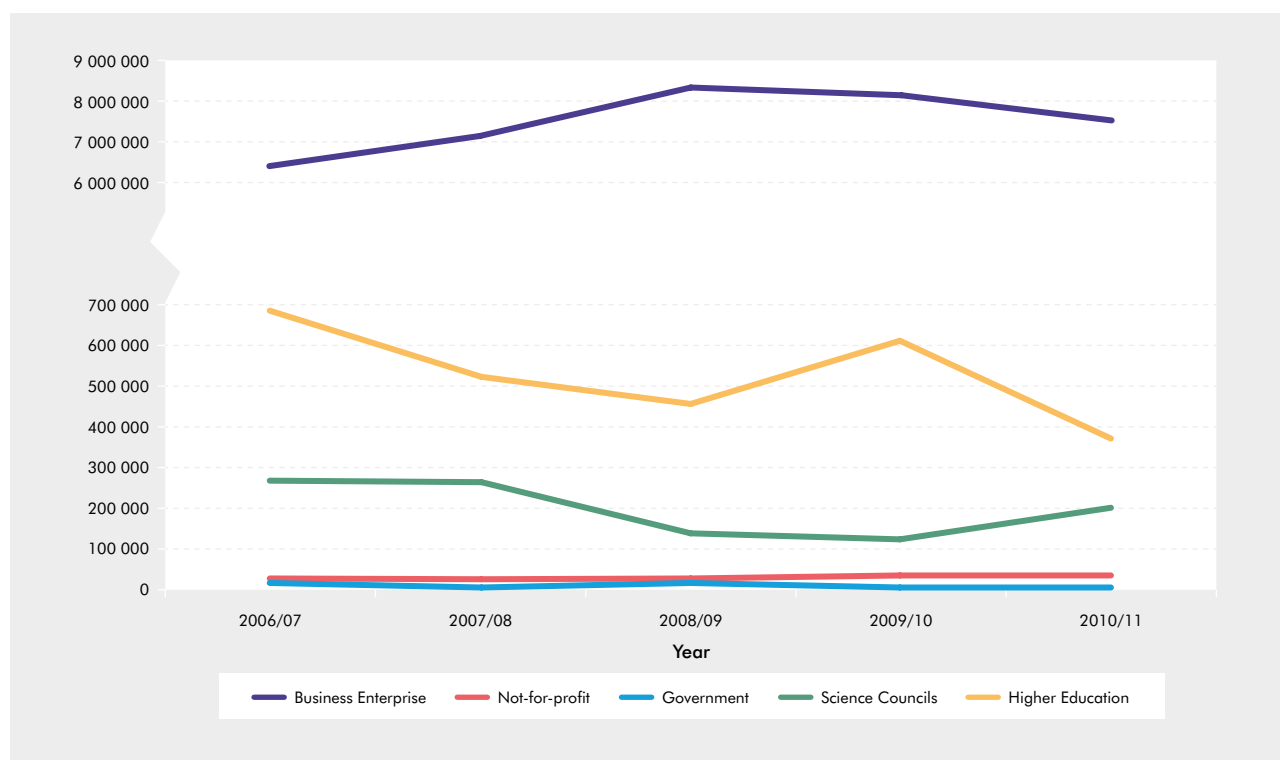
The business sector almost exclusively funded its own research in the period 2006/07 to 2010/11, but such funding in current Rand values decreased from R8.339 billion in 2008/09 to R7.529 billion in 2010/11 (Table 3.1, Figure 3.3), which corresponds to a decrease from R6.652 billion in 2008/09 to R5.184 billion in 2010/11 at constant 2005 Rand values. The not-for-profit and government sectors combined received less than 0.5% of the total business funding of R&D between 2007/08 and 2010/11.

Table 3.1: Business-funded R&amp;D by sector of performance (R'000), South Africa, 2006/07 to 2010/11

SECTOR	2006/07	2007/08	2008/09	2009/10	2010/11
Business	6 414 319	7 133 913	8 339 379	8 142 996	7 528 667
Not-for-profit	24 339	23 791	26 591	32 427	31 627
Government	13 067	5 343	15 980	2 326	2 406
Science councils	265 441	263 098	137 356	120 528	198 206
Higher education	682 493	519 804	454 184	609 250	367 340
Total (current Rand values)	8 479 223	7 945 949	8 973 490	8 907 527	8 128 246
Total (constant 2005 Rand values)	7 959 648	6 902 865	7 158 363	6 630 805	5 596 559



Figure 3.3: Business-funded R&amp;D by sector of performance (R'000), South Africa, 2006/07 to 2010/11



**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 to 2010/11.

### 3.4 Government funding of local R&D

Higher education institutions and science councils were the largest recipients of government funding in 2010/11, receiving R4.222 billion and R2.932 billion respectively (Table 3.2). The business sector received R832 million from government in current Rand values in 2010/11. At constant 2005 Rand values, higher education institutions received R2.907 billion, science councils R2.019 billion and business R573 million in government funding of local R&D. Total government-funded R&D peaked in 2008/09 at R9.498 billion before decreasing to R9.019 billion in 2010/11, which was well above the R6.672 billion recorded in 2006/07.

Science councils were the largest recipient of R&D funding from government in 2006/07 (R2.134 billion) followed by higher education institutions (R1.806 billion) and business (R1.764 billion).

Table 3.2: Government-funded R&amp;D (R'000), South Africa, 2006/07 to 2010/11

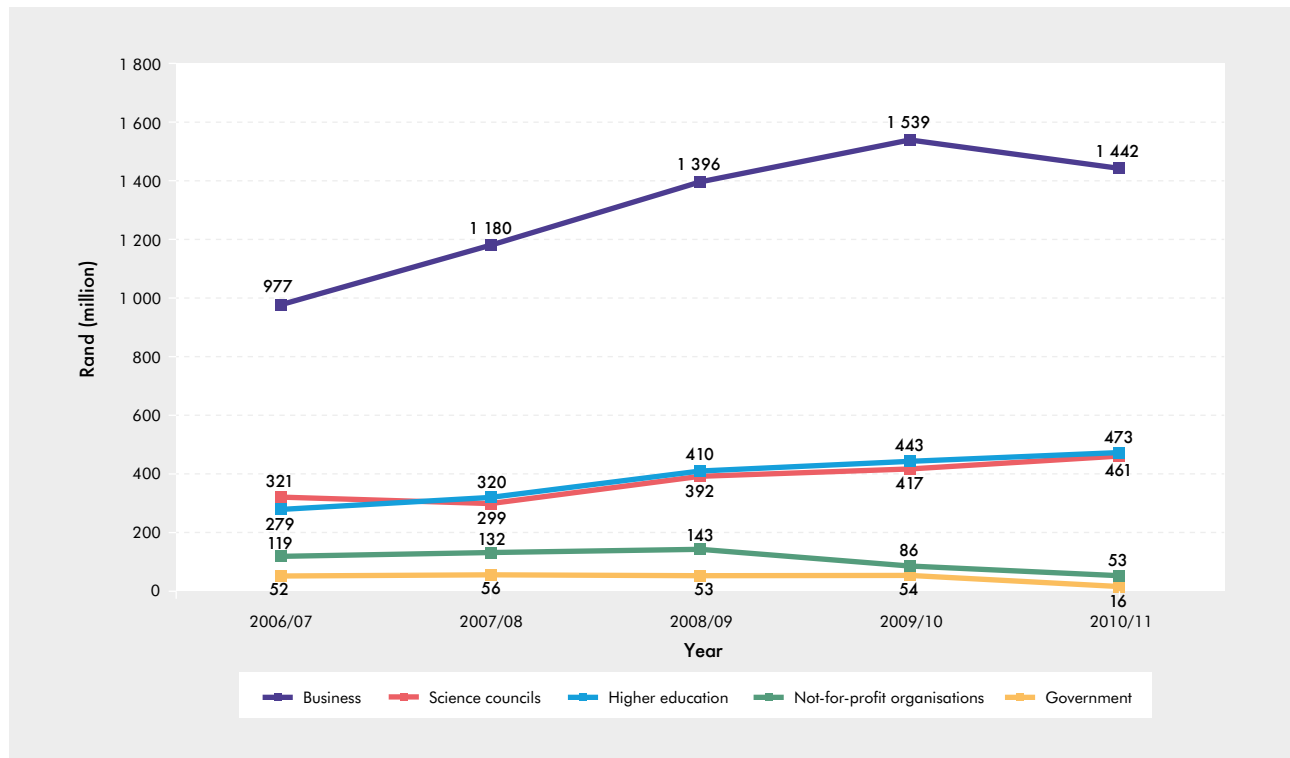
SECTOR	2006/07	2007/08	2008/09	2009/10	2010/11
Business	1 764 448	2 326 728	2 567 140	1 429 766	832 173
Not-for-profit	29 816	33 399	32 711	38 484	41 830
Government	937 005	1 091 049	1 068 527	1 008 475	990 290
Science councils	2 134 960	2 297 322	2 602 458	2 917 683	2 932 489
Higher education	1 805 793	2 761 557	3 226 674	3 918 620	4 222 092
Total (current Rand values)	6 672 022	8 510 055	9 497 510	9 313 028	9 018 874
Total (constant 2005 Rand values)	6 263 185	7 392 919	7 576 386	6 932 662	6 209 785

**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 to 2010/11.  
GDP values: Stats SA P0441: GDP, 3rd Quarter (2012)

### 3.5 Foreign funding of local R&D

The proportion of foreign-funded R&D has been consistently highest in the business sector, with funding peaking at R1.539 billion in 2009/10 before decreasing to R1.442 billion in 2010/11, in current Rand values (Figure 3.4). At constant 2005 Rand values, these amounted to R1.146 billion in 2009/10 and R993 million in 2010/11. There have been decreases in foreign R&D funding of not-for-profit organisations and government between 2006/07 and 2010/11, while foreign funding of R&D in higher education institutions and science councils increased over the same period.

Figure 3.4: Foreign-funded R&D by sector of performance (R million), South Africa, 2006/07 to 2010/11



**DATA NOTE** Foreign funding of R&D includes all funding from foreign sources from all sectors.

**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 to 2010/11.

# CHAPTER 4

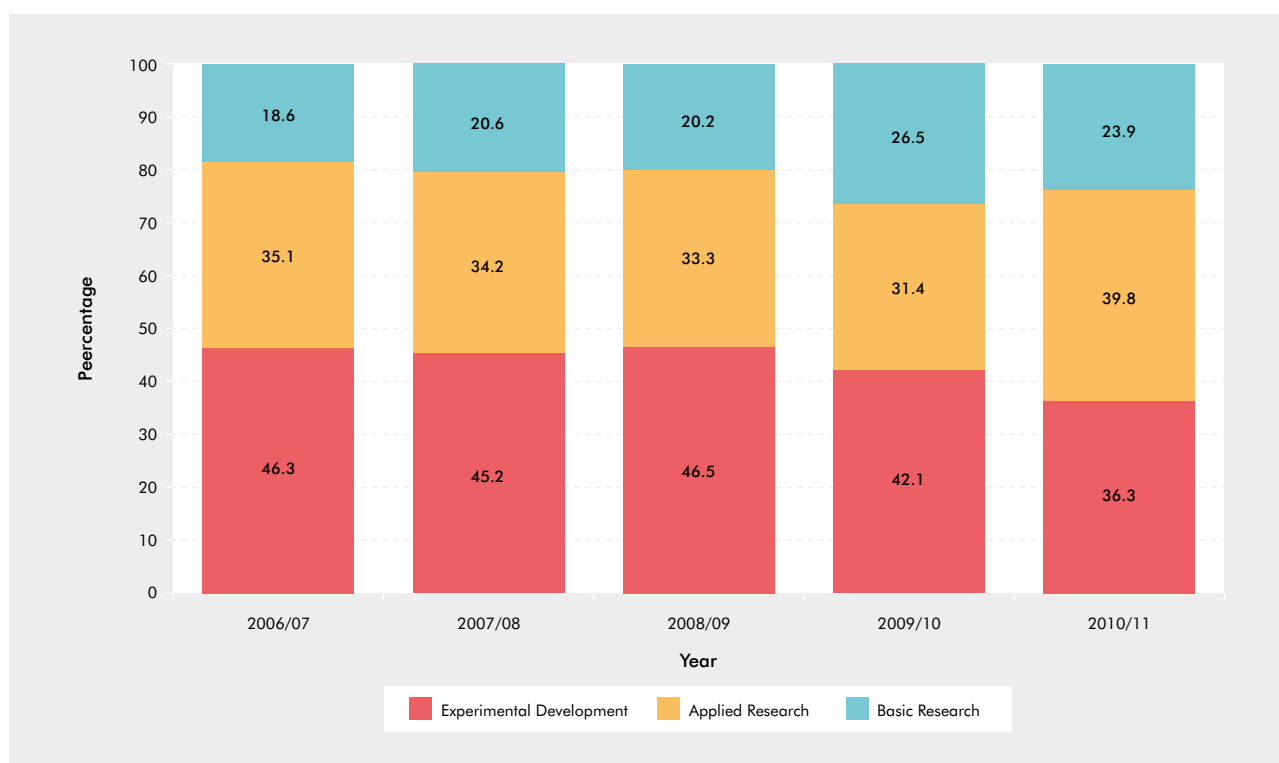
## CATEGORIES OF GERD

### 4.1 GERD by type of research

R&D expenditure on applied research accounted for the largest proportion of R&D expenditure in 2010/11, comprising 39.8%, followed by experimental development at 36.3% and basic research at 23.9% (Figure 4.1).

There were shifts in the overall composition of GERD by type of research. The share of GERD apportioned to basic research increased from 18.6% in 2006/07 to 26.5% in 2009/10 and decreased to 23.9% in 2010/11. The proportion of applied research also increased over that period, from 35.1% in 2006/07 to 39.8% in 2010/11, while the proportion of experimental development decreased from 46.3% in 2006/07 to 36.3% in 2010/11.

**Figure 4.1: GERD by type of research (percentage), South Africa, 2006/07 to 2010/11**



#### DEFINITIONS

**Basic research** is research undertaken primarily to extend the boundaries of knowledge, with no specific application in view.

**Applied research** is original investigation to acquire new knowledge with a specific application in view.

**Experimental development** is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

#### NOTE

R&D covers both formal R&D in R&D units and informal or occasional R&D in other units or across an organisation.

**Source:** OECD Frascati Manual (OECD 2002).

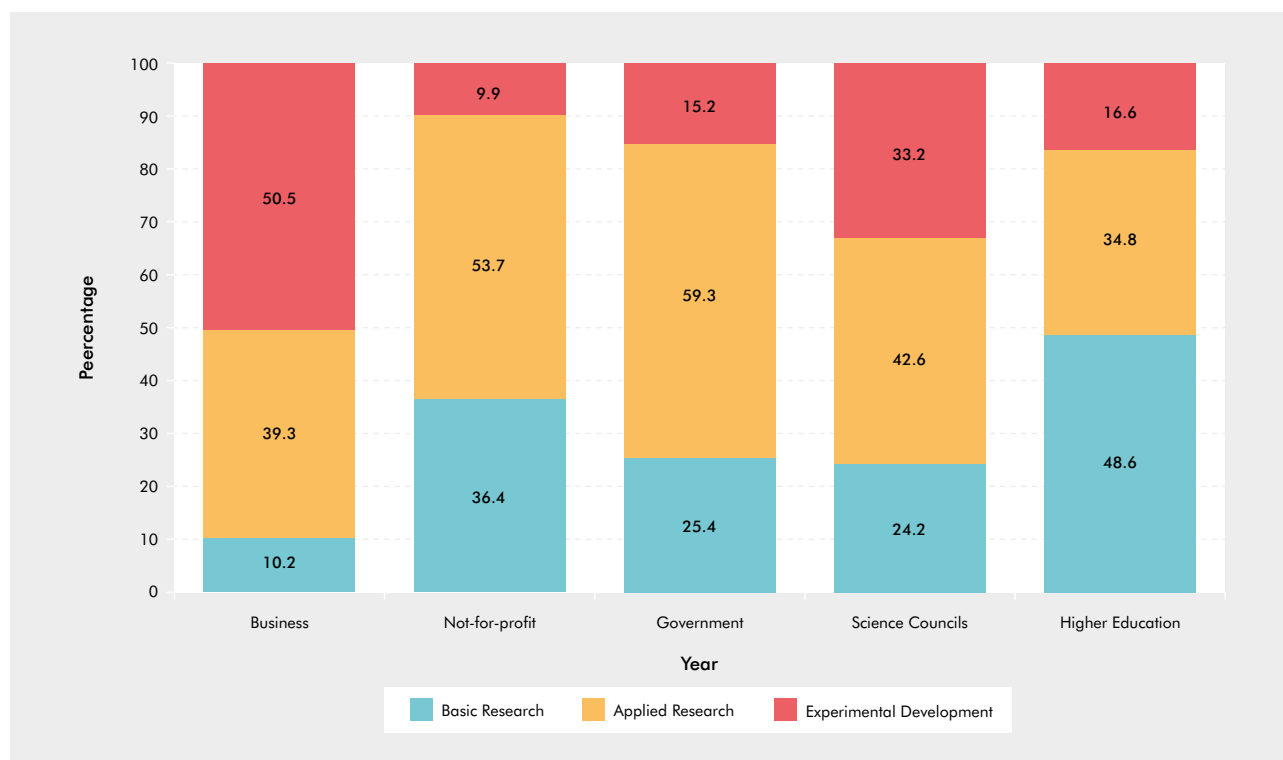
#### DATA SOURCE

National Survey of Research and Experimental Development, 2006/07 to 2010/11

## 4.2 GERD by type of research and sector of performance

The higher education sector was the largest performer of basic research, while R&D activities in the business sector inclined towards experimental development. However, applied research was more dominant in government, not-for-profit and science councils (Figure 4.2).

Figure 4.2: GERD by type of research and sector of performance (percentages), South Africa, 2010/11



### DEFINITION

**Basic research** is research undertaken primarily to extend the boundaries of knowledge, with no specific application in view.

**Applied research** is original investigation to acquire new knowledge with a specific application in view.

**Experimental development** is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

**R&D** covers both formal R&D in R&D units and informal or occasional R&D in other units or across an organisation.

**Source:** Source: OECD Frascati Manual (2002)

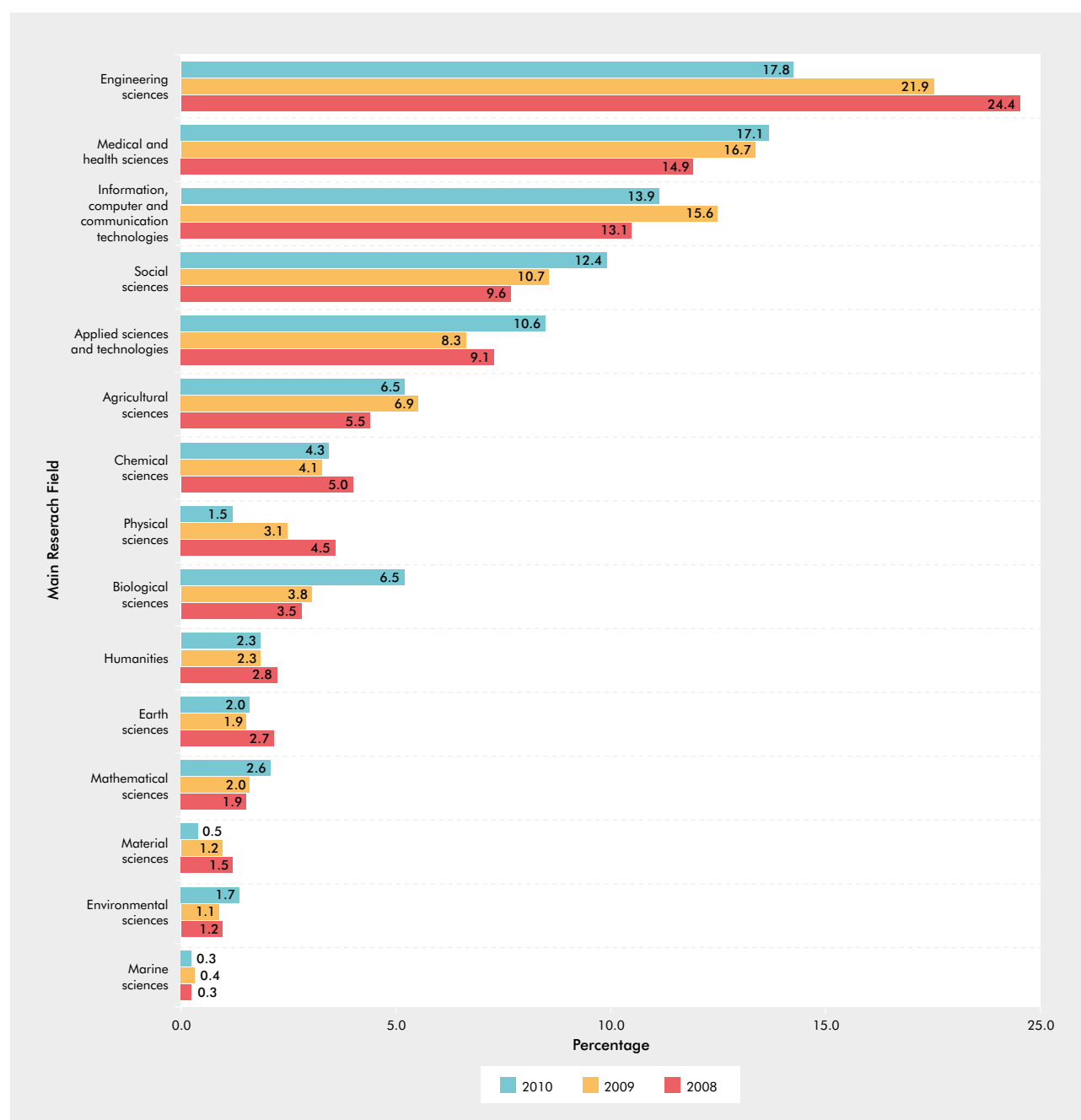
### DATA SOURCE

National Survey of Research and Experimental Development 2010/11.

### 4.3 GERD by major research field

The largest percentage of GERD in South Africa during 2010/11 was spent on the engineering sciences (17.8%); followed by the medical and health sciences (17.1%); information, computer and communication technologies (13.9%); and social sciences (12.4%) (Figure 4.3). This is similar to results observed in 2008/09 and 2009/10. The largest decrease was observed in the engineering sciences where GERD decreased from 24.4% in 2008/09 to 17.8% in 2010/11, and this is associated with the decline in BERD.

Figure 4.3: GERD by research field (percentage), South Africa, 2008/09 to 2010/11



**DATA NOTE** GERD according to research fields as measured in the R&D survey.

**DATA SOURCE** National Survey of Research and Experimental Development, 2008/09 to 2010/11.

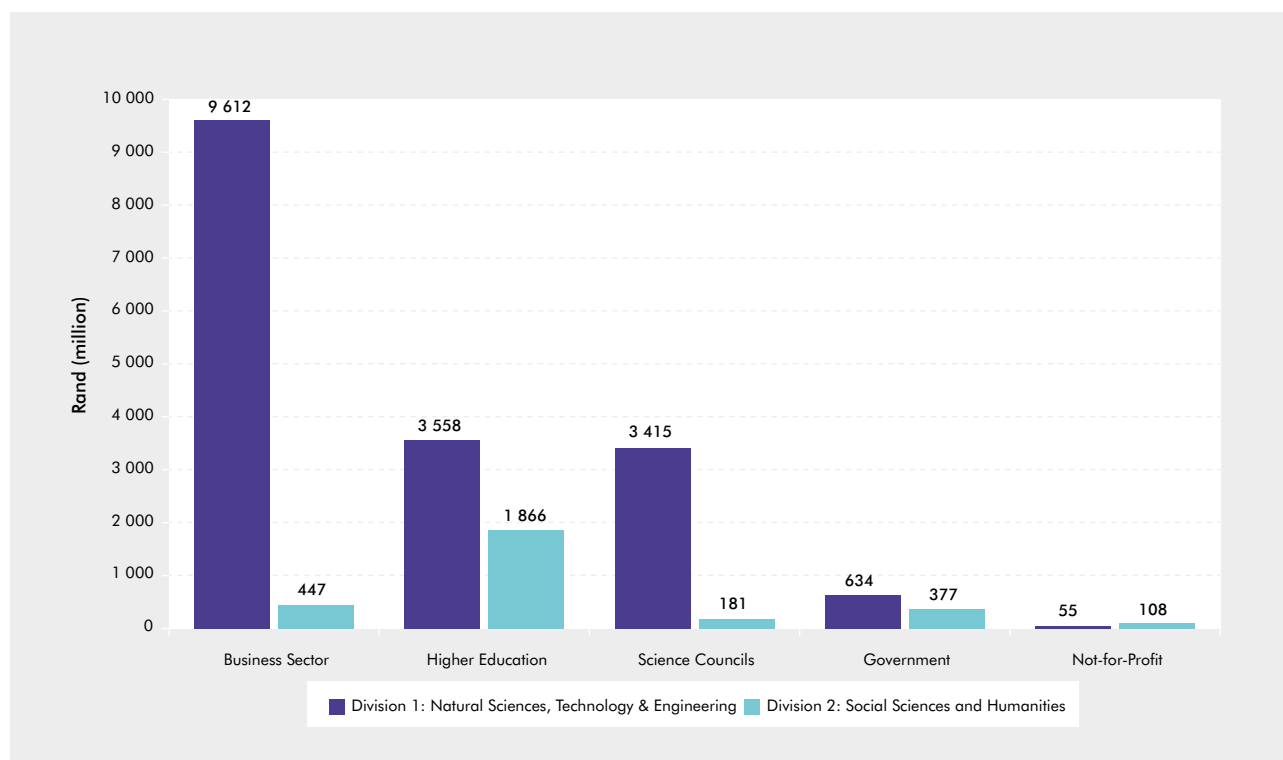


## 4.4 GERD by division of research field and sector of performance

Division 1 which includes natural sciences, technology and engineering remained the main field of R&D expenditure in 2010/11, accounting for 85.3% of GERD, while Division 2 representing social sciences and humanities accounted for 14.7% (Figure 4.4).

R&D in social sciences and humanities increased from R2.719 billion in 2009/10 to R 2.979 billion in 2010/11.

**Figure 4.4: R&D expenditure by research field (R million), South Africa, 2010/11**

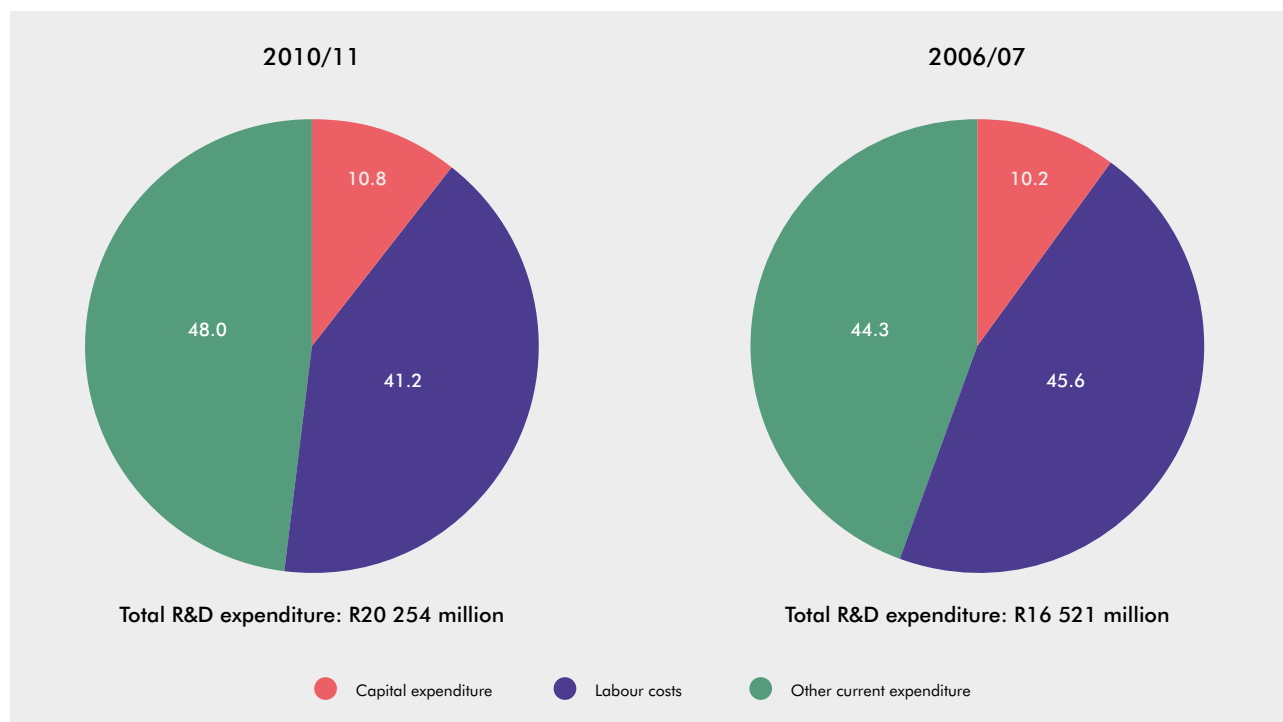


<b>DATA NOTE</b>	Research field codes are used to classify research expenditure according to defined scientific disciplines into two divisions: Division 1 (Natural sciences, technology and engineering) and Division 2 (Social sciences and humanities).
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 2010/11.

## 4.5 R&D expenditure by accounting category

The proportion of R&D expenditure allocated to labour costs dropped from 45.6% in 2006/07 to 41.2% in 2010/11, while the percentage of R&D expenditure allocated to other current expenditure rose from 44.3% in 2006/07 to 48.0% in 2010/11. The percentage of R&D expenditure on capital items remained largely unchanged between 10% and 11% in 2006/07 and 2010/11.

**Figure 4.5: R&D expenditure by accounting category (percentage), South Africa, 2006/07 and 2010/11**

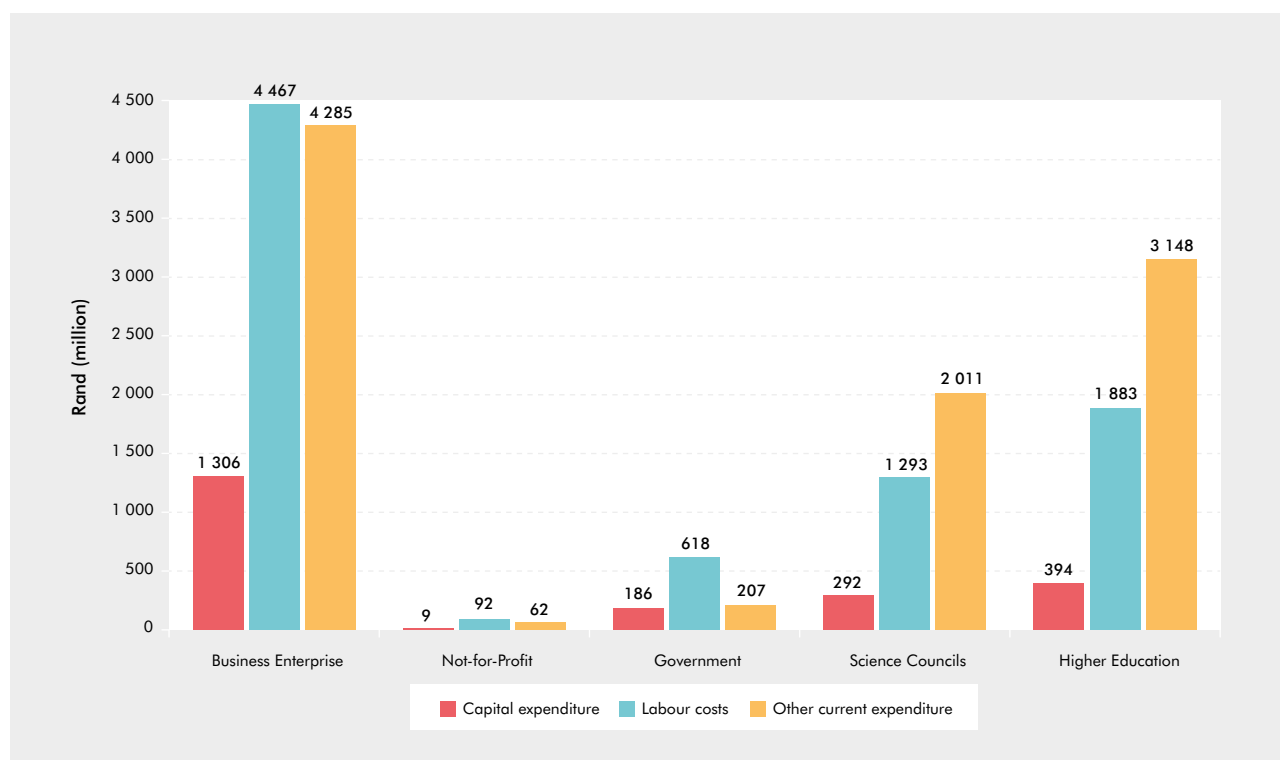


**DATA SOURCE**

National Survey of Research and Experimental Development, 2010/11, 2006/07

Capital expenditure contributed the least to total R&D expenditure across all sectors in 2010/11. Labour costs and other current expenditure accounted for approximately equal percentages of total R&D expenditure in the business sector. Labour costs in the higher education and science councils sectors totalled more than half the amount spent on other current expenditure, while in the business, government and not-for-profit sectors, labour costs were higher than other current expenditure.

Figure 4.6: R&D expenditure by accounting category (R million), South Africa, 2010/11



#### DEFINITION

**Capital expenditure** is the annual gross expenditure on fixed assets used in the R&D programmes of statistical units. Such expenditure is reported in full in the period in which it took place and is registered as an element of depreciation. Capital expenditure includes expenditure on land, buildings, instruments and equipment.

**Labour costs** comprise annual wages and salaries and all associated costs or fringe benefits, such as bonus payments, holiday pay, contributions to pension funds and other social security payments, and payroll taxes. The labour costs of persons providing indirect services that are not included in the personnel data (such as security and maintenance personnel or the staff of central libraries, computer departments or head offices) are excluded from labour costs and included in other current expenditure.

**Other current expenditure** comprises non-capital purchases of materials, supplies and equipment to support R&D performed by the statistical unit in a given year.

**Source:** OECD Frascati Manual (OECD 2002).

#### DATA SOURCE

National Survey of Research and Experimental Development R&D, 2010/11.

## 4.6 Business sector R&D expenditure by standard industrial classification (SIC)

The overall composition of BERD by standard industrial classification (SIC) remained generally unchanged between 2006/07 and 2010/11, with the exception of the decrease observed in R&D expenditure in the electricity, gas and water supply industries (Figure 4.7). Manufacturing together with financial and business services accounted for a large proportion of BERD, spending R3.592 billion and R3.327 billion respectively in 2010/11 (Figure 4.7).

The comparison between 2009/10 and 2010/11 data showed that mining and quarrying remained the third largest contributor to BERD. It had the largest increase in spending of all the sectors between 2009/10 and 2010/11, namely a 111.5% year-on-year increase amounting to R557 million. Manufacturing, the financial and business services, together with the electricity, gas and water supply industries, were collectively responsible for 87.7% of the decline in GERD between 2009/10 and 2010/11. The decrease in R&D spending in the manufacturing sector was accounted for by a decrease of R561 million in the manufacture of refined petroleum, coke and nuclear fuel; chemicals and chemical products (including pharmaceuticals); and rubber and plastic.

**Figure 4.7: Business R&D expenditure by standard industrial classification (as a percentage of GERD), South Africa, 2006/07 and 2010/11**

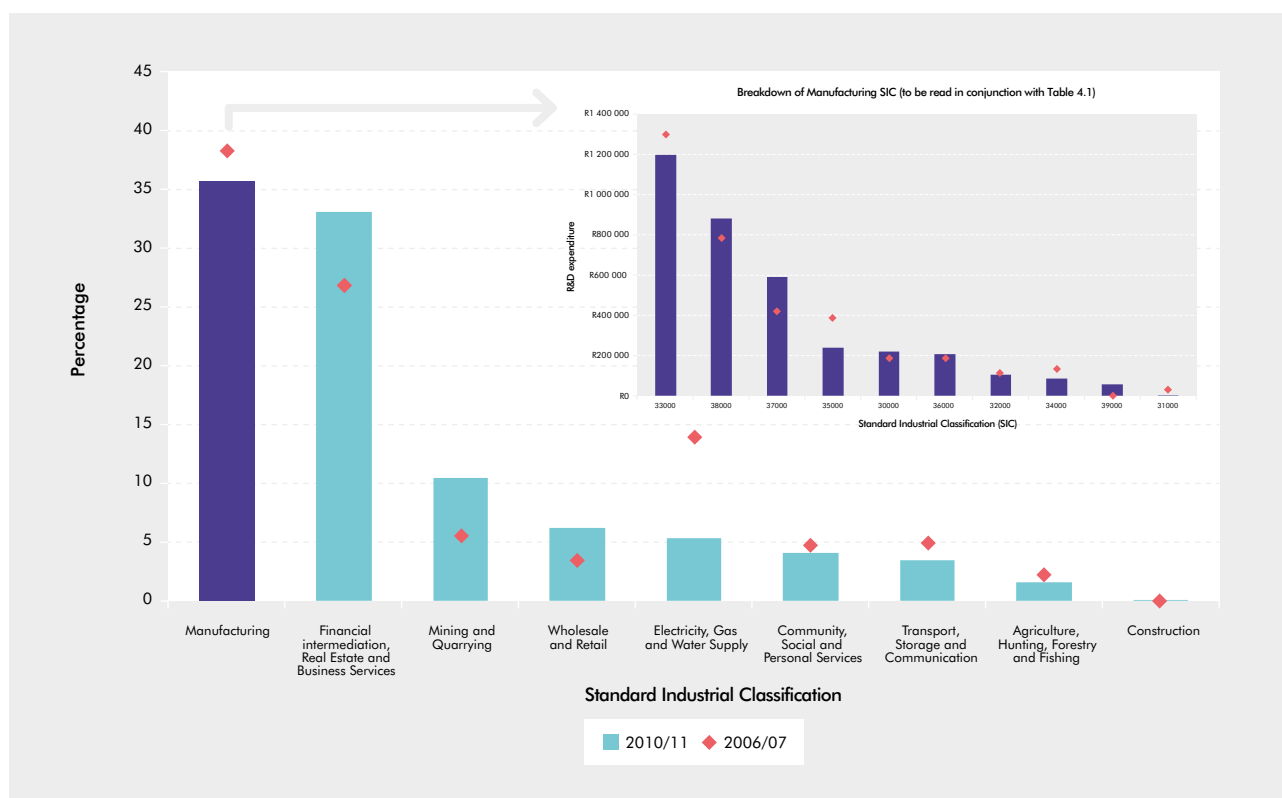


Table 4.1: Standard industrial classification (SIC) Codes

<b>33000</b>	Manufacture of Refined Petroleum, Nuclear Fuel, Chemicals (incl. Pharmaceuticals), Rubber and Plastic
<b>38000</b>	Manufacture of Transport Equipment
<b>37000</b>	Manufacture of Radio, Television and Communication Equipment, Medical and Optical Instruments
<b>35000</b>	Manufacture of Basic Metals, Metal Products, Machinery & Equipment and Office Machinery
<b>30000</b>	Manufacture of Food Products, Beverages and Tobacco Products
<b>36000</b>	Manufacture of Electrical Machinery and Apparatus
<b>32000</b>	Manufacture of Wood and Products, Paper and Printing
<b>34000</b>	Manufacture of Non-Metallic Mineral Products
<b>39000</b>	Manufacture of Furniture, Recycling, Manufacturing not elsewhere classified
<b>31000</b>	Manufacture of Textiles, Clothing and Leather Goods

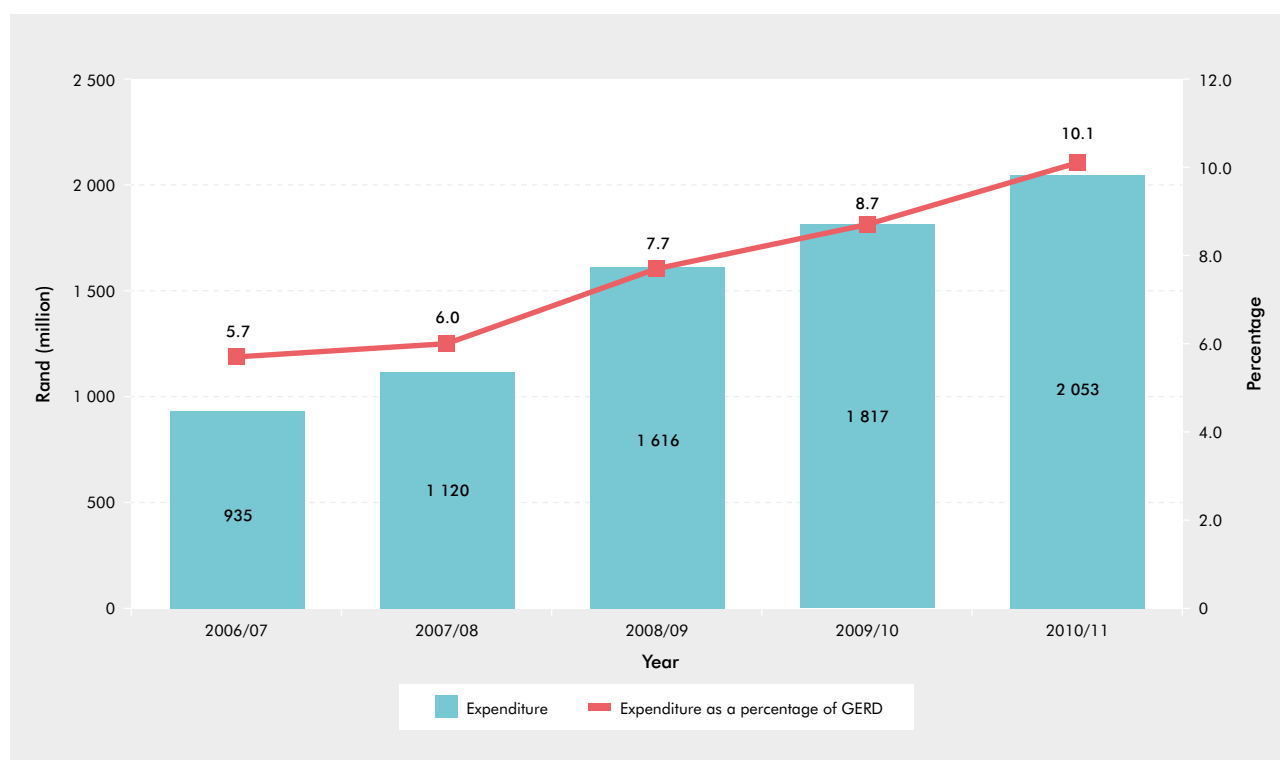
<b>DEFINITION</b>	Industry classification is based on the Stats SA's five-digit standard industrial classifications (SIC) codes that are used to classify businesses according to their economic activities.
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 2010/11.

## 4.7 Areas of special interest

### 4.7.1 R&D on Tuberculosis, HIV/AIDS and Malaria

R&D expenditure on tuberculosis (TB), HIV/AIDS and malaria increased from R935 million in 2006/07 to R2.053 billion in 2010/11 (Figure 4.8). This expenditure, as a percentage of GERD has more than doubled from 4.6% in 2006/07 to 10.1% in 2010/11.

Figure 4.8: R&D expenditure on TB, HIV/AIDS and malaria (R million, and as a percentage of GERD), South Africa, 2006/07 to 2010/11



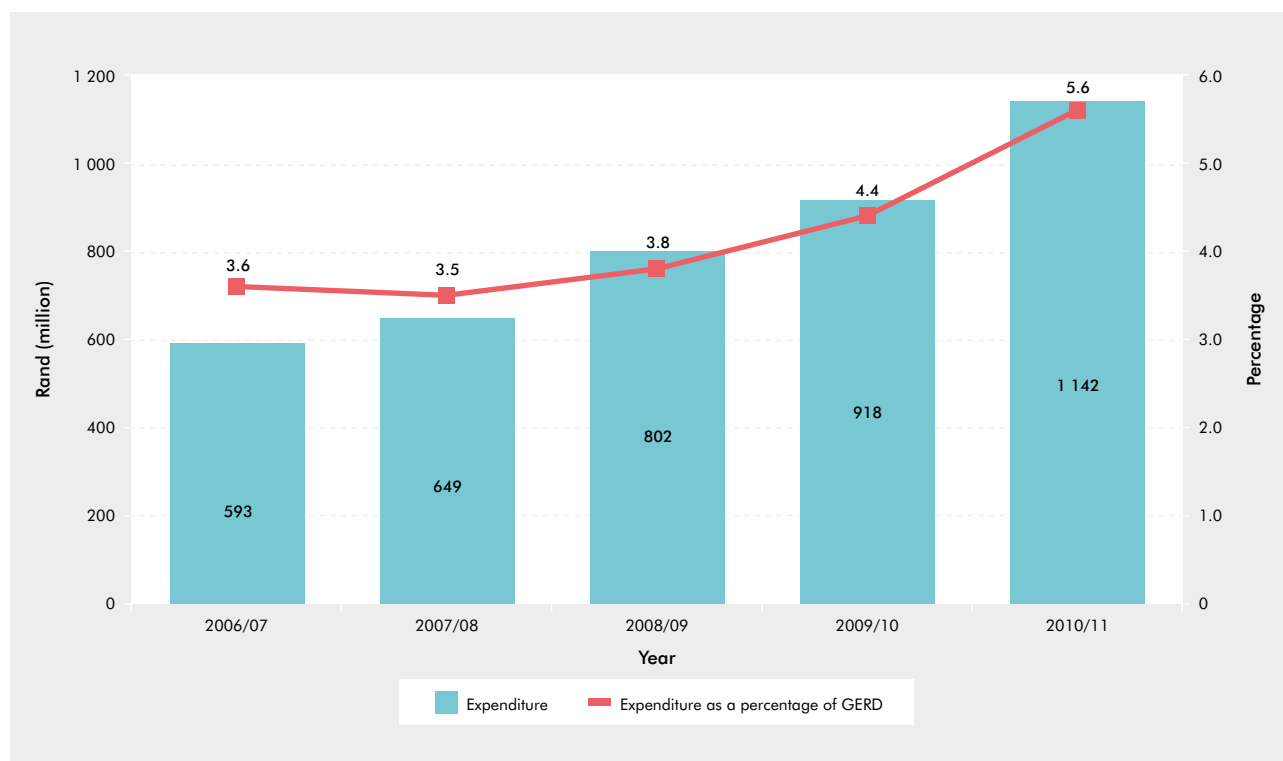
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 2006/07 to 2010/11.
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#### 4.7.2 Biotechnology related R&D

R&D expenditure on biotechnology increased from R593 million in 2006/07 to R1.142 billion in 2010/11. R&D expenditure on biotechnology accounted for 5.6% of GERD in 2010/11, having increased from 2.9% in 2006/07 (Figure 4.9).

**Figure 4.9: R&D expenditure on biotechnology, South Africa, (R million and as a percentage of GERD), 2006/07 to 2010/11**



#### DATA SOURCE

National Survey of Research and Experimental Development, 2006/07 to 2010/11.

# CHAPTER 5

## PEOPLE IN R&D

### 5.1 R&D personnel

R&D personnel headcounts totalled 55 531 in 2010/11, which is 3 963 fewer than in 2009/10 (Figure 5.1). Substantial increases in R&D personnel were reported between 2001/02 (when R&D personnel totalled 32 501) and 2004/05 (when the numbers had increased to 56 453). However, from 2005 onwards the headcount increased only marginally each year. The trend for full-time equivalent (FTE) R&D personnel was similar to that for headcounts. FTE R&D personnel totalled 29 486.4 in 2010/11, having decreased by 4.5% from the 30 891.3 reported in 2009/10.

Figure 5.1: R&D personnel (headcount and FTEs), South Africa, 2001/02 to 2010/11

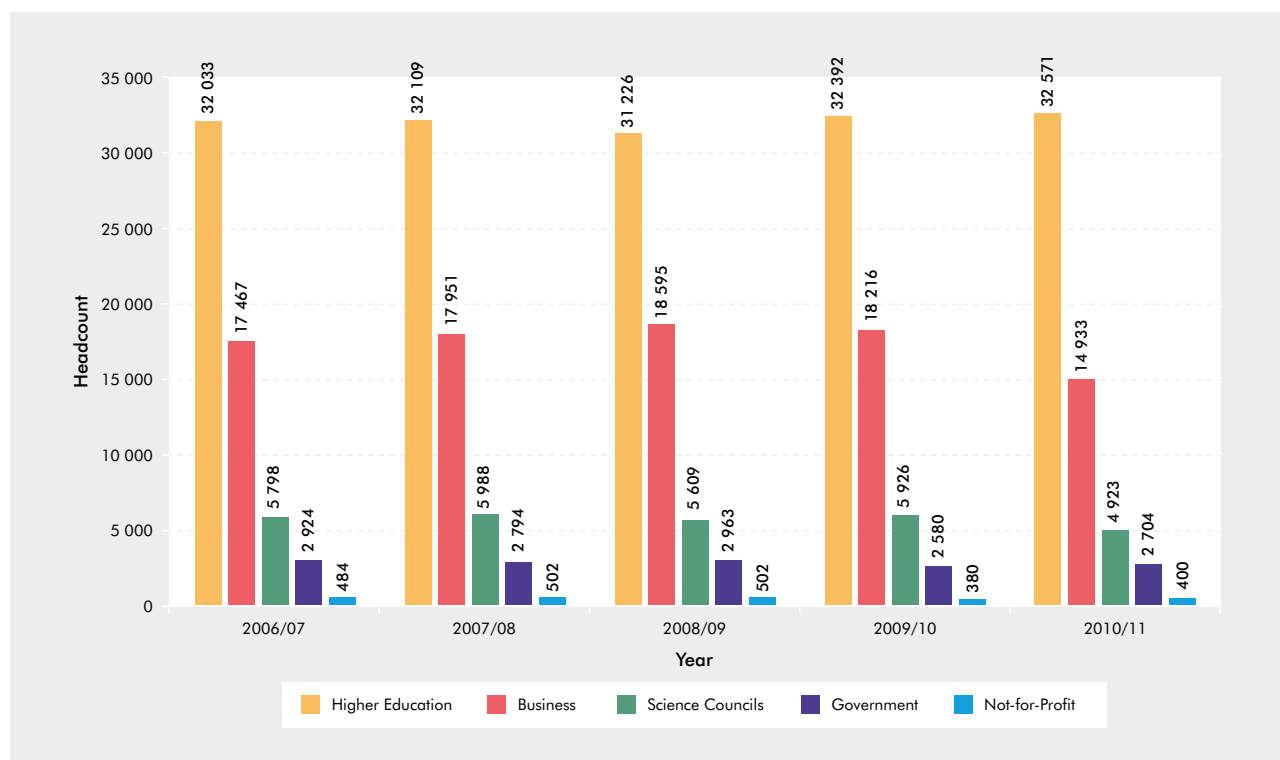


DEFINITIONS	<i>R&amp;D personnel includes all persons employed directly on R&amp;D activities, as well as those providing direct services such as R&amp;D managers, administrators and clerical staff.</i>
	<b>Headcount</b> refers to the actual number of people directly involved in or supporting R&D activities. This includes researchers, technicians and other personnel directly supporting R&D.
	<b>Full-time equivalent (FTE)</b> refers to the number of hours (in terms of person years of effort) spent on R&D activities.
DATA SOURCE	National Survey of Research and Experimental Development, 2001/02 to 2010/11.
DATA NOTE	Following OECD practice, doctoral students and post-doctoral fellows are counted as researchers.

### 5.1.1 R&D personnel headcounts by sector of performance

The higher education sector employed most R&D personnel, followed by the business sector, science councils, government and the not-for-profit sector (Figure 5.2). This pattern has remained generally unchanged over the years and defines the landscape of R&D personnel and researcher workforce in South Africa.

Figure 5.2: R&D personnel by sector (headcount), South Africa, 2006/07 to 2010/11

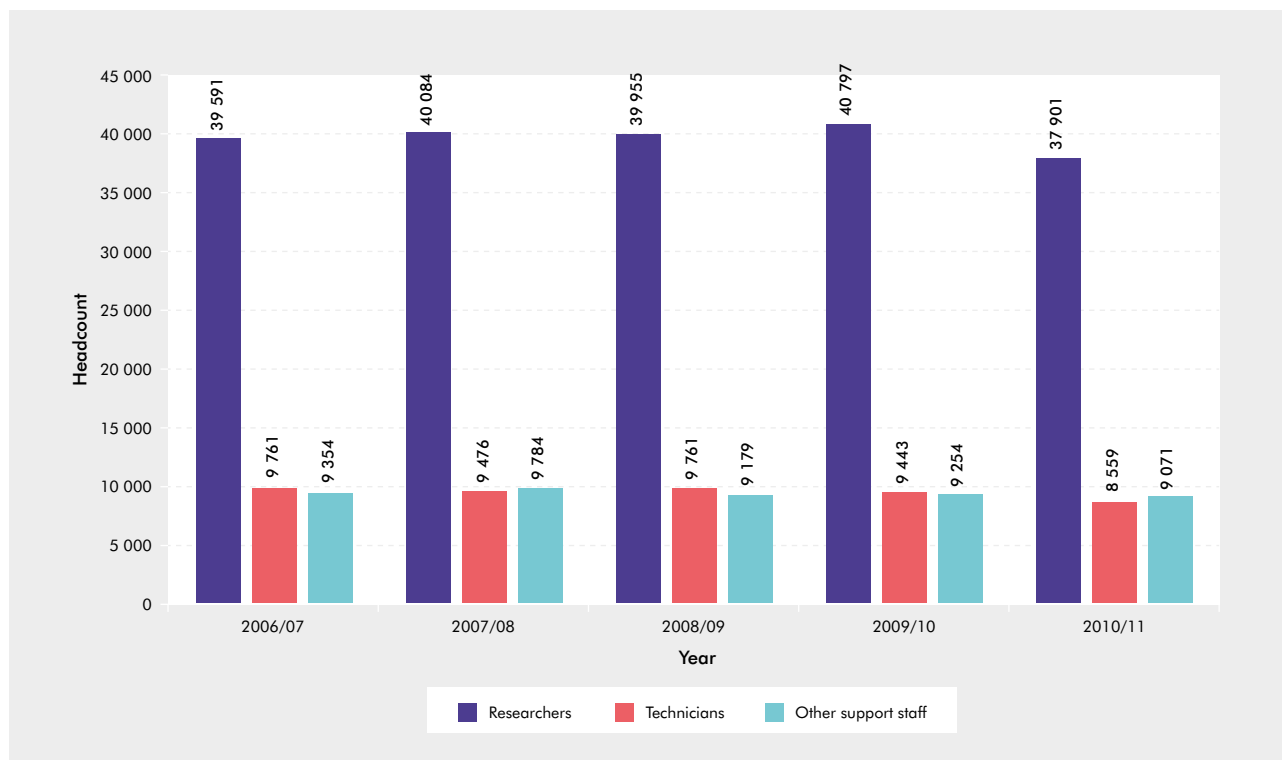


DATA NOTE	Higher education R&D personnel includes post-doctoral fellows and doctoral students.
DEFINITION	<p>R&amp;D personnel includes all persons employed directly on R&amp;D activities, as well as those providing direct services such as R&amp;D managers, administrators and clerical staff.</p> <p><b>Headcount</b> refers to the actual number of people directly involved in or supporting R&amp;D. It is international best practice to include post-doctoral fellows and doctoral students as research personnel.</p>
DATA SOURCE	National Survey of Research and Experimental Development, 2006/07 to 2010/11

### 5.1.2 R&D personnel headcounts by occupation

Researchers totalled 37 901 in 2010/11 and accounted for 68.3% of the R&D workforce. The headcounts of researchers averaged approximately 40 000 between 2006/07 and 2009/10, but decreased to 37 901 in 2010/11. The headcounts of technicians and other support staff directly supporting R&D remained below 10 000 between 2006/07 and 2010/11.

Figure 5.3: R&D personnel by occupation (headcount), South Africa, 2006/07 to 2010/11



#### DEFINITION

**Researchers** are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned.

**Technicians and equivalent staff** are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences, or social sciences and humanities.

**Other support staff** includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

#### DATA SOURCE

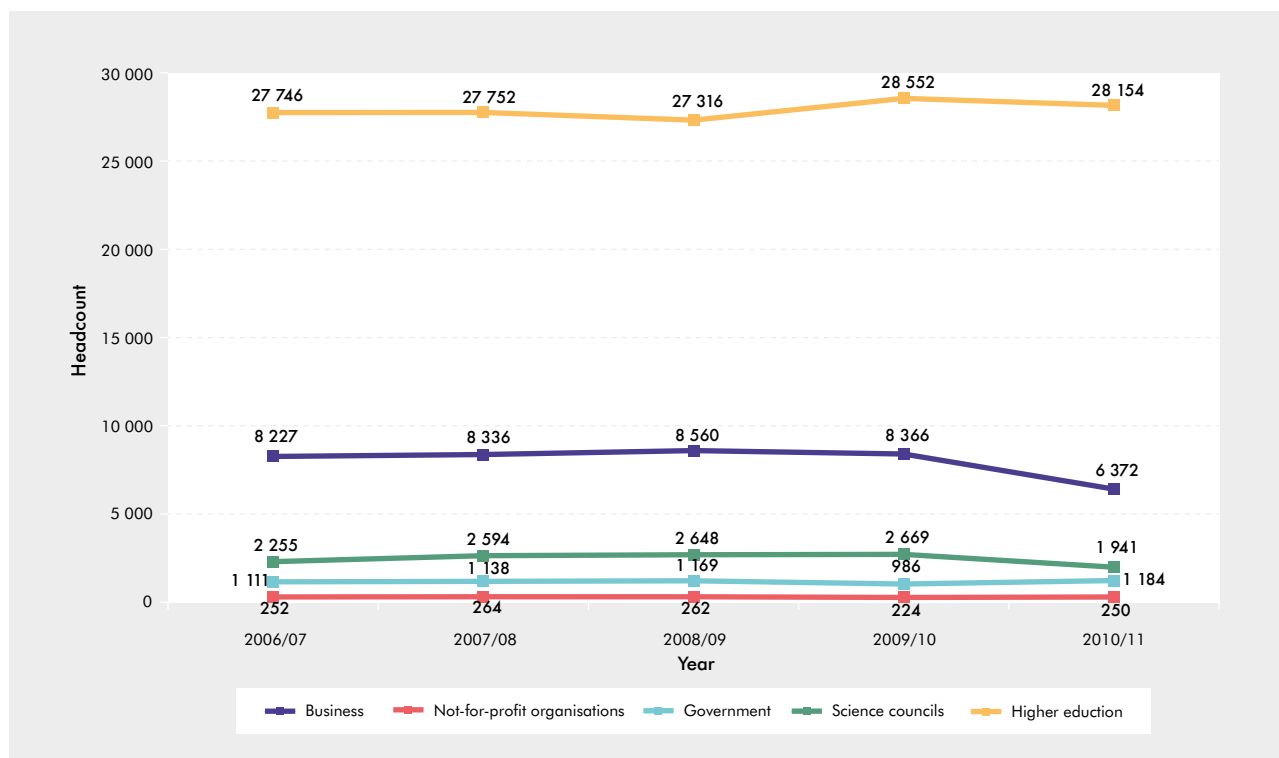
National Survey of Research and Experimental Development, 2006/07 to 2010/11.

## 5.2 Researchers

### 5.2.1 Researchers (headcount) by sector of performance

The higher education sector employed the largest number of researchers, with headcounts totalling 28 154 in 2010/11 (Figure 5.4). There were evident decreases in the number of researchers in both the business and science councils sectors between 2009/10 and 2010/11. The headcount of researchers in the government and not-for-profit sectors remained generally unchanged between 2006/07 and 2010/11.

Figure 5.4: R&D researchers by sector (headcount), South Africa, 2006/07 to 2010/11



**DATA NOTE** Higher education R&D personnel includes post-doctoral fellows and doctoral students.

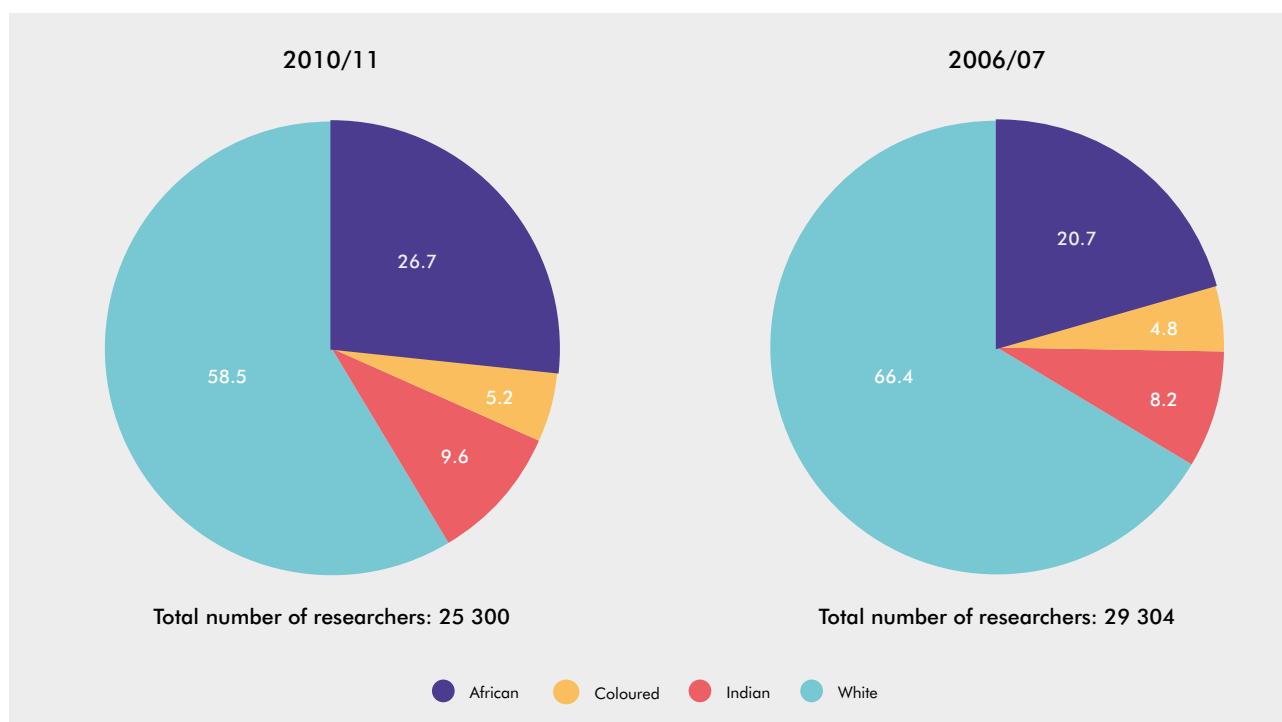
**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 to 2010/11.

### 5.2.2 Researchers (excluding post-doctoral fellows and doctoral students) by race

White researchers accounted for 58.6% of the total headcount of researchers in 2010/11, followed by African researchers at 26.7%, Indian researchers at 9.6% and Coloured researchers at 5.2%. However, the overall racial composition of the researcher workforce has been shifting. The proportion of African researchers increased from 20.7% in 2006/07 to 26.7% in 2010/11, while the proportion of Indian researchers increased from 8.2% to 9.6% over the same period.

The proportion of Coloured researchers showed the least growth, from 4.8% in 2006/07 to 5.2% in 2010/11. The major driver of the changing demographics of researchers is the increase in the proportion of African and Coloured post-doctoral and doctoral students from 35.9% and 5.6% in 2006/07, to 42.5% and 5.9% in 2010/11 respectively (see Figure 5.12 in Section 5.3.4).

**Figure 5.5: Researchers by race (percentage), South Africa, 2006/07 and 2010/11**

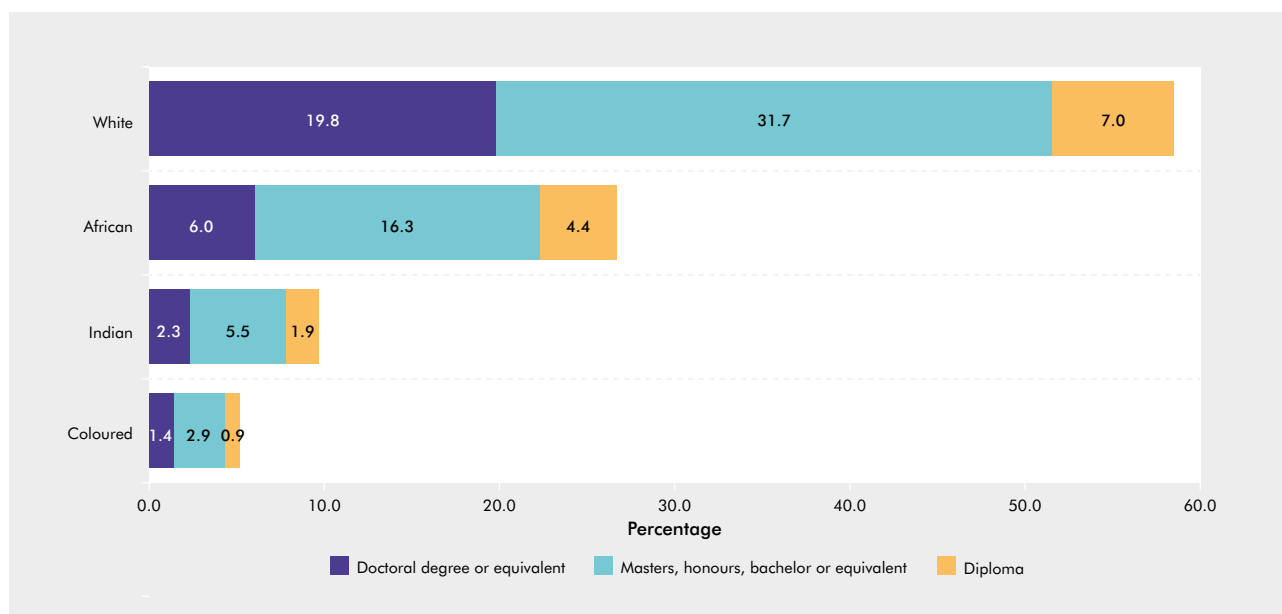


<b>DEFINITION</b>	The population is classified according to the following race groups: African, Coloured, Indian and White.
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 2006/07 and 2010/11.
<b>DATA NOTE</b>	Higher education researchers do not include post-doctoral fellows and doctoral students.

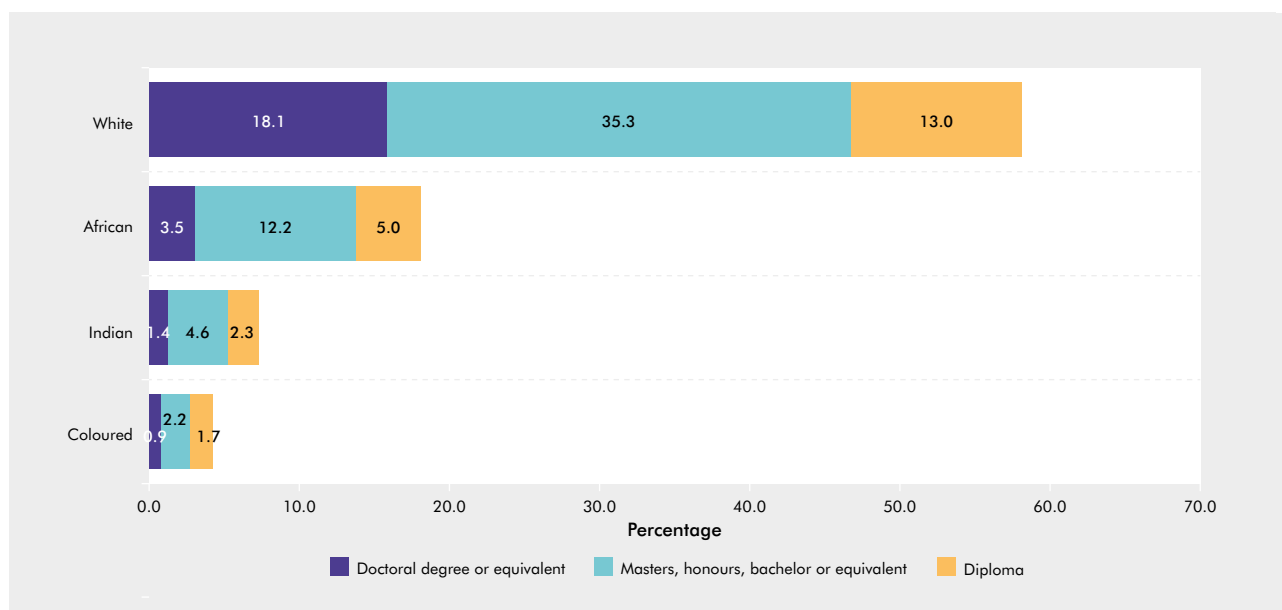
### 5.2.3 Researchers (excluding post-doctoral fellows and doctoral students) by qualification and race

In the 2010/11 R&D survey, White researchers with a doctoral qualification remained in the majority (19.8%) with a 1.7% increase since the 2006/07 survey (Figures 5.6 and 5.7). African researchers with a doctoral degree increased from 3.5% of all researchers in 2006/07 to 6.0% in 2010/11. The greater proportion of South African researchers held a masters, honours, bachelor or equivalent degree.

**Figure 5.6: Researchers by qualification and race (percentage), South Africa, 2010/11**



**Figure 5.7: Researchers by qualification and race (percentage), South Africa, 2006/07**



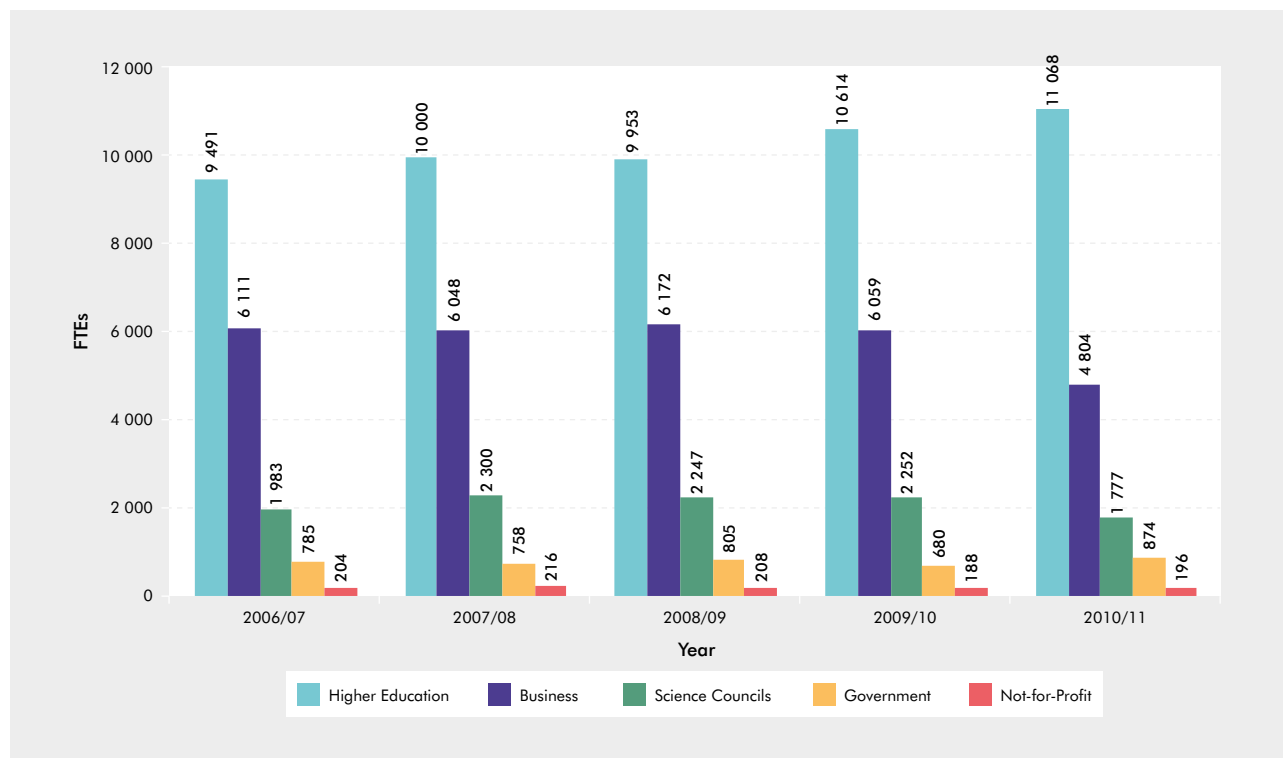
<b>DATA NOTE</b>	Higher education researchers do not include post-doctoral fellows and doctoral students.
<b>DEFINITION</b>	The population is classified according to the following race groups: African, Coloured, Indian and White.
<b>DATA SOURCE</b>	National Survey of Research and Experimental Development, 2006/07 and 2010/11



### 5.2.4 Full-time equivalent (FTE) researchers by sector

Researcher FTEs followed similar trends to those observed for R&D personnel. The higher education sector showed an increase in FTE researchers between 2008/09 and 2010/11; the higher education sector accounted for 11 067.9 FTE researchers in the 2010/11 reference period. The business and science council sectors showed a decrease in FTE researchers between 2008/09 and 2010/11.

**Figure 5.8: Researchers by sector (FTEs), South Africa, 2006/07 to 2010/11**



**DATA NOTE** Higher education researchers includes post-doctoral fellows and doctoral students.

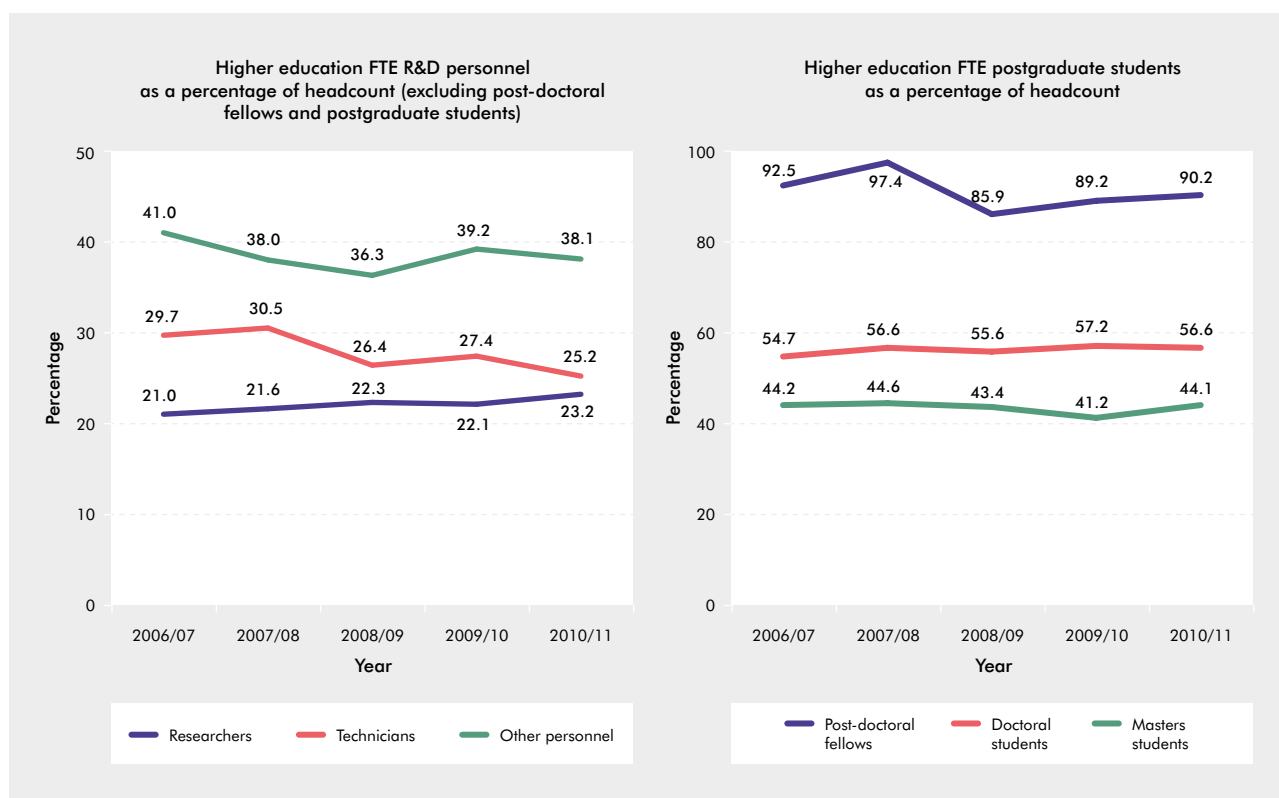
**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 - 2010/11.

## 5.3 Higher education R&D personnel

### 5.3.1 Higher education R&D personnel: FTE as a percentage of headcounts

The higher education sector was the largest contributor to the R&D workforce in South Africa, but R&D personnel in this sector appeared to spend less time on research. Higher education researchers (excluding post-doctoral fellows and postgraduate students) spent approximately 20% of their time on research. The rest of their time was spent on institutional requirements such as teaching and other related activities. Doctoral students reported that they spent less than 60% of their time on research activities, and masters students spent even less time on research.

**Figure 5.9: Higher education R&D personnel (FTE as a percentage of headcount), South Africa, 2006/07 to 2010/11**



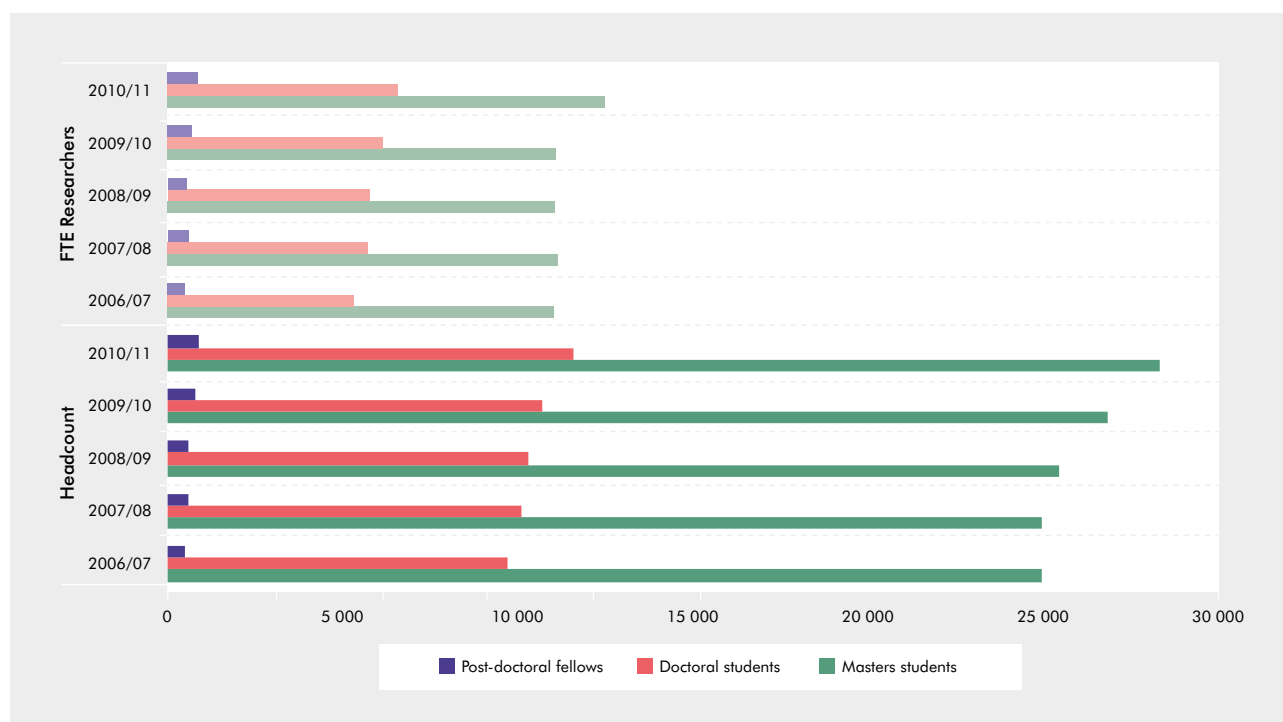
**DATA NOTE** FTE as a percentage of headcount.

**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 to 2010/11.

### 5.3.2 Postgraduate students headcount and full-time equivalents (FTEs)

There was a continual upward trend in headcount and FTEs among post-doctoral fellows, and doctoral and masters students between 2006/07 and 2010/11. Doctoral students headcount exceeded 10 000, reaching 11 640 in 2010/11 and spending an average of 57.2% of their time on research. The highest number of masters students headcount between 2006/07 and 2010/11 was recorded at 28 373 in 2010/11; these masters students spent an average of 44.1% of their time on research.

**Figure 5.10: Higher education postgraduate students (headcount and FTE researchers), South Africa, 2006/07 to 2010/11**



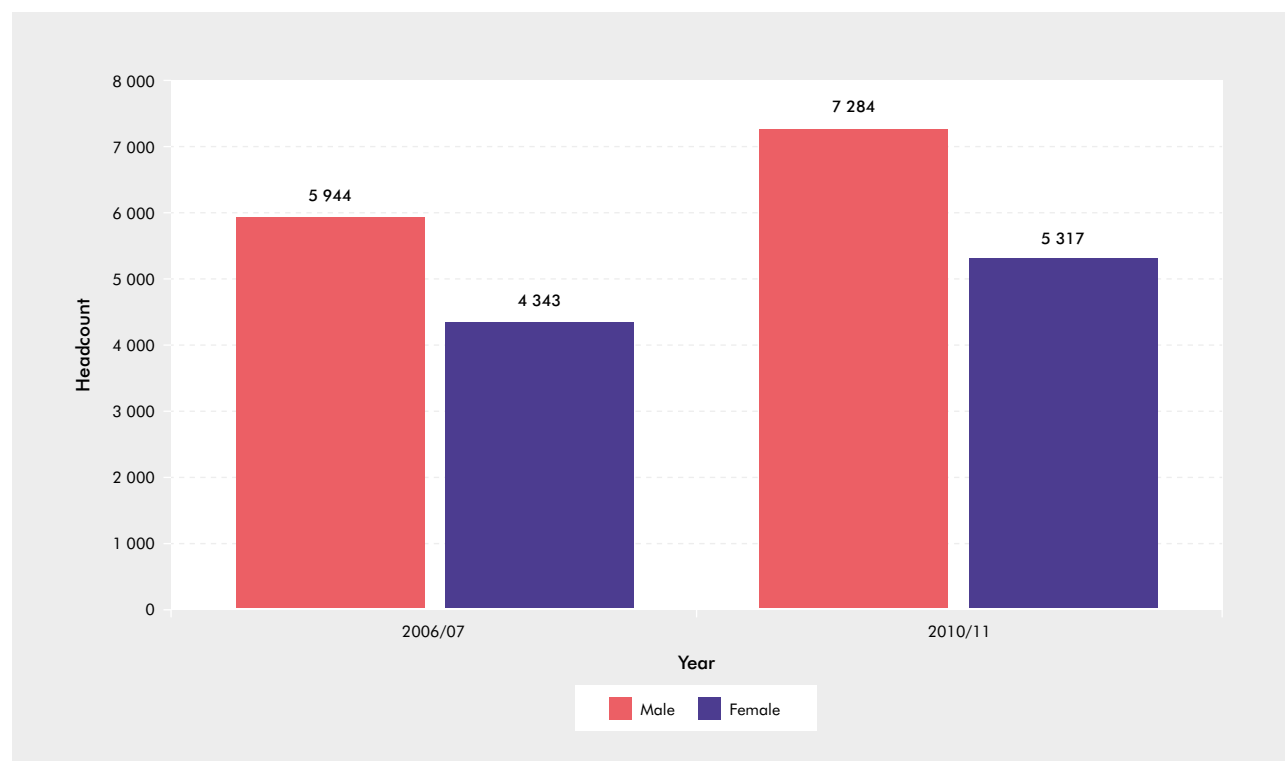
#### DATA SOURCE

National Survey of Research and Experimental Development, 2006/07 to 2010/11.

### 5.3.3 Post-doctoral fellows and doctoral students by gender (headcount)

Post-doctoral fellows and doctoral students remained predominantly male between 2006/07 and 2010/11 at 57.8%. The number of postgraduate students involved in research increased between 2006/07 and 2010/11.

**Figure 5.11: Higher education post-doctoral fellows and doctoral students by gender (headcount), South Africa, 2006/07 and 2010/11**

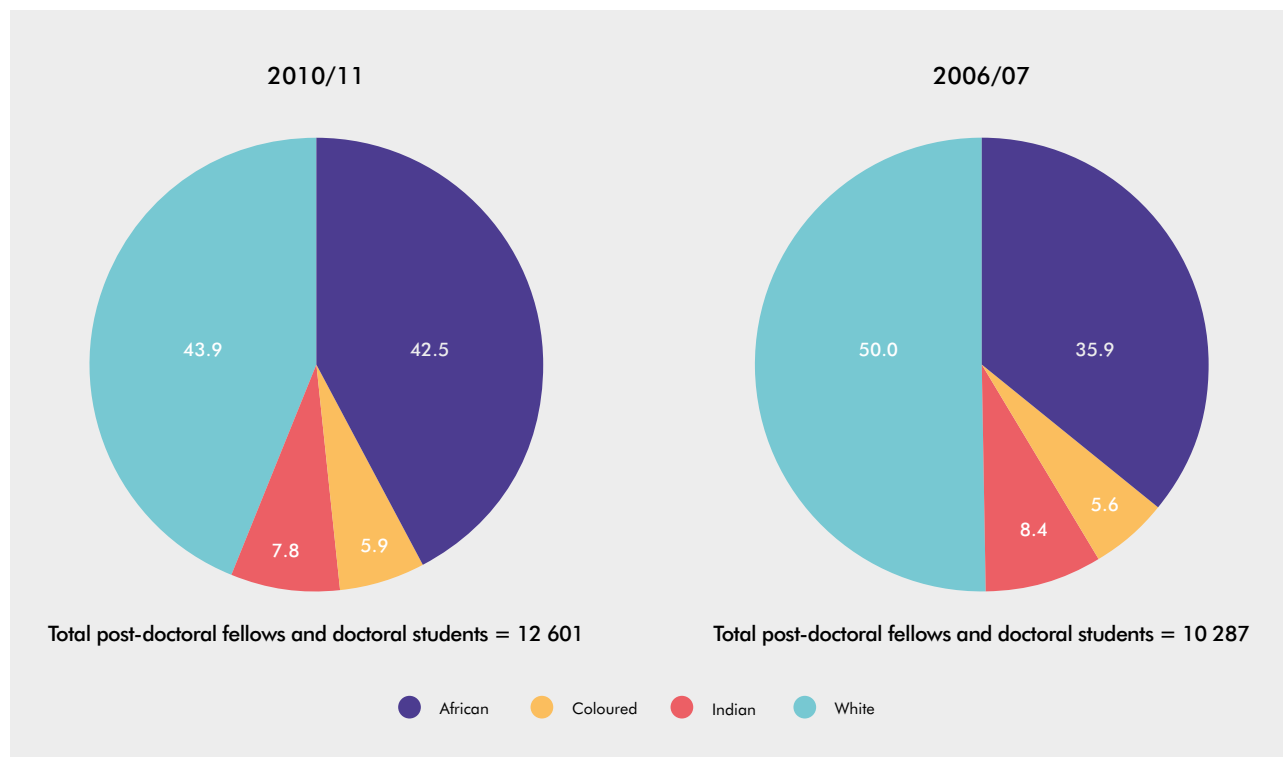
**DATA SOURCE**

National Survey of Research and Experimental Development, 2006/07 and 2010/11.

### 5.3.4 Post-doctoral fellows and doctoral students by race (headcount)

In 2006/07, half of all post-doctoral fellows and doctoral students were White. There was an increase in the percentage of African post-doctoral fellows and doctoral students from 35.9% in 2006/07 to 42.5% in 2010/11. The percentage of Indian and Coloured postgraduate students remained almost constant between 2006/07 and 2010/11.

**Figure 5.12: Higher education post-doctoral fellows and doctoral students by race (headcount), South Africa, 2006/07 and 2010/11**



**DATA SOURCE** National Survey of Research and Experimental Development, 2006/07 and 2010/11.

# CHAPTER 6

## GEOGRAPHIC DIMENSIONS OF R&D

### 6.1 R&D expenditure by province

R&D in South Africa was concentrated in Gauteng, Western Cape and KwaZulu-Natal provinces (Figure 6.1 and Table 6.2). GERD in these three provinces accounted for 80.5% of total GERD in 2010/11. The respective shares of GERD in 2010/11 were 48.3% for Gauteng, 20.9% for Western Cape and 11.3% for KwaZulu-Natal. In 2006/07, these shares were, respectively, 51.1%, 20.4% and 11.0% for Gauteng, Western Cape and KwaZulu-Natal.

Figure 6.1: National map of R&D expenditure (R million), South Africa, 2010/11

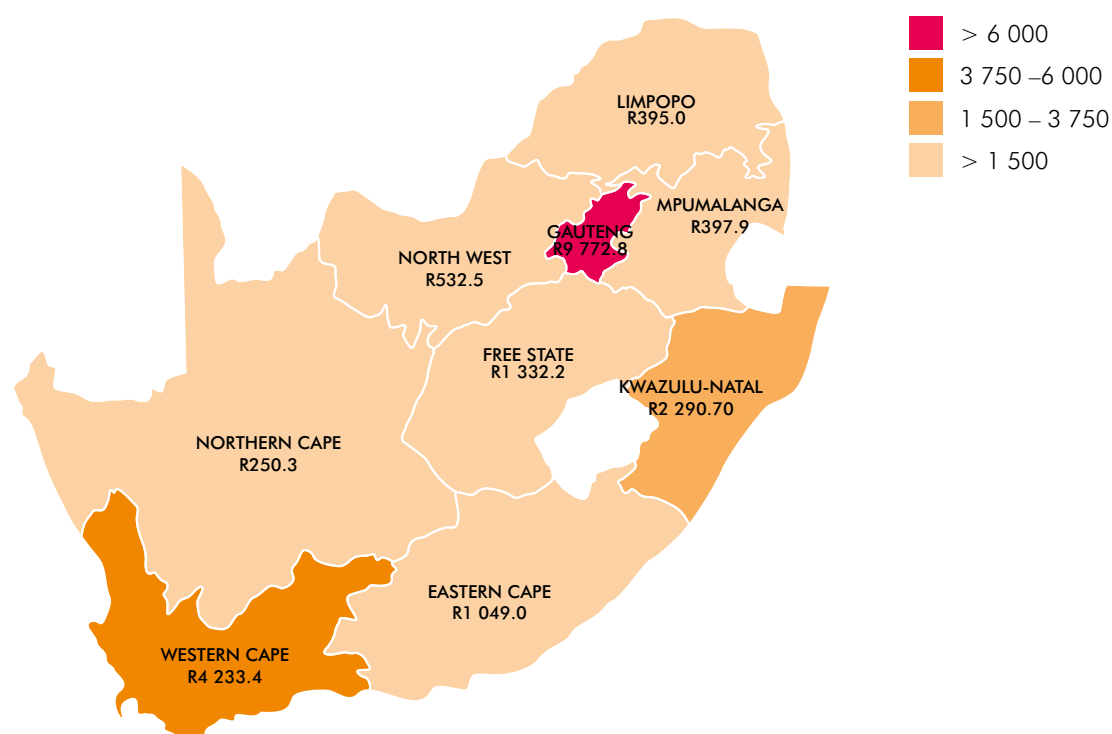


Table 6.1: R&D expenditure by province (R'000), 2006/07

2006/07 DATA	GAUTENG	WESTERN CAPE	KWAZULU-NATAL	FREE STATE	EASTERN CAPE	NORTHERN CAPE	MPUMALANGA	LIMPOPO	NORTH-WEST
Rand'000	8 447 470	3 373 098	1 809 013	944 829	752 303	402 461	369 535	240 952	180 923
%	51.1	20.4	11	5.7	4.6	2.4	2.2	1.5	1.1

**DATA SOURCE** National Survey of Research and Experimental Development R&D, 2006/07 and 2010/11.

## 6.2 R&D expenditure by province and sector of performance

In the 2010/11 R&D survey the business sector proportional contribution to the provincial R&D expenditure was highest in the Free State at 70.8%, while the higher education sector was highest in Limpopo at 56.9%. The science councils and government proportional contributions were the highest in the Northern Cape at 25.9% and 23.5% respectively. The not-for-profit sector proportional contribution was highest in Mpumalanga at 3.3% (see Table 6.2 for 2006/07 data).

Figure 6.2: R&D expenditure by province and sector of performance (percentage), 2010/11

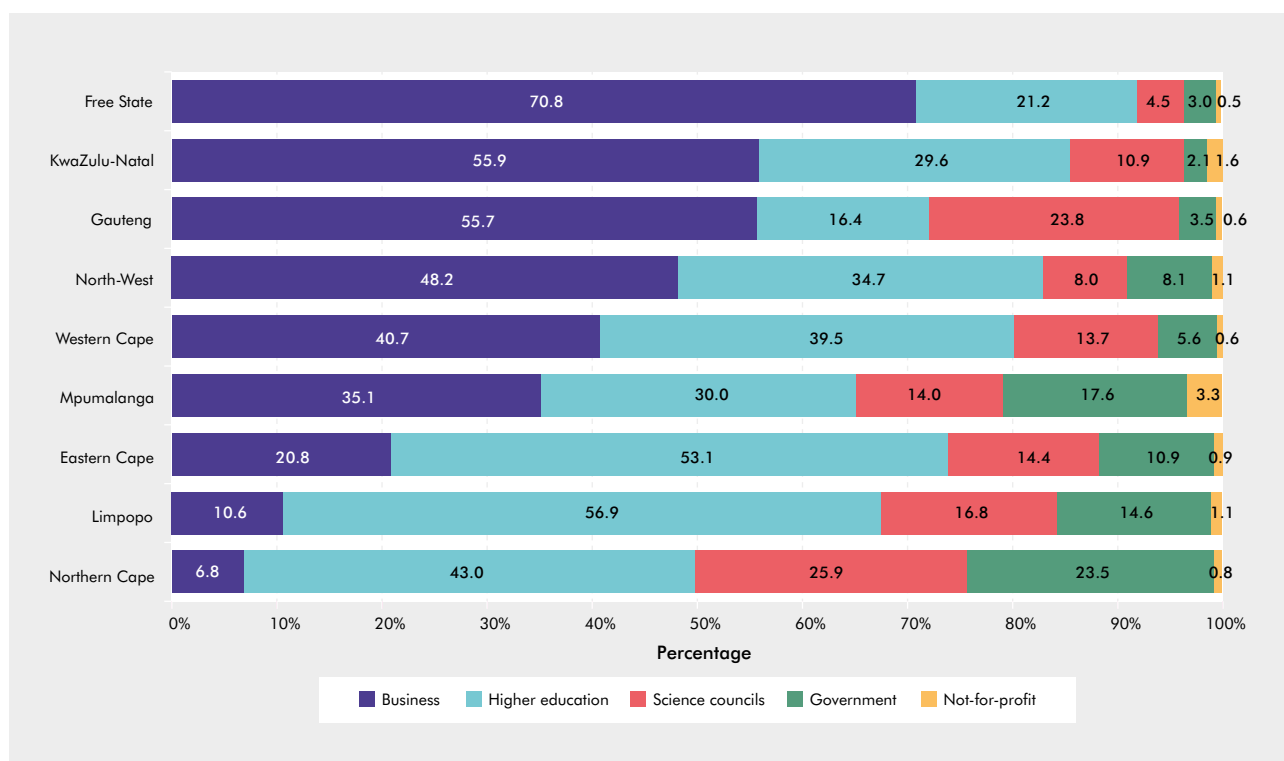


Table 6.2: R&D expenditure by sector of performance and province (R'000 and percentage), 2006/07

PROVINCE	BUSINESS ENTERPRISE		GOVERNMENT		HIGHER EDUCATION		NOT-FOR-PROFIT		SCIENCE COUNCILS		TOTAL R 000
	R 000	%	R 000	%	R 000	%	R 000	%	R 000	%	
Eastern Cape	247 295	32.9	109 779	14.6	259 254	34.5	4 850	0.6	131 126	17.4	752 303
Free State	665 443	70.4	69 314	7.3	155 326	16.4	1 974	0.2	52 773	5.6	944 829
Gauteng	5 263 546	62.3	321 176	3.8	1 214 575	14.4	102 141	1.2	1 546 032	18.3	8 447 470
KwaZulu-Natal	962 308	53.2	84 192	4.7	451 992	25.0	42 902	2.4	267 620	14.8	1 809 013
Limpopo	72 813	30.2	31 118	12.9	63 233	26.2	3 979	1.7	69 808	29.0	240 952
Mpumalanga	172 948	46.8	50 568	13.7	67 029	18.1	9 131	2.5	69 859	18.9	369 535
North-West	15 834	8.8	64 733	35.8	42 944	23.7	1 736	1.0	55 676	30.8	180 923
Northern Cape	197 383	49.0	32 889	8.2	97 246	24.2	1 974	0.5	72 968	18.1	402 461
Western Cape	1 645 595	48.8	257 586	7.6	947 209	28.1	43 852	1.3	478 856	14.2	3 373 098
<b>Total</b>	<b>9 243 165</b>		<b>1 021 355</b>		<b>3 298 808</b>		<b>212 538</b>		<b>2 744 718</b>		<b>16 520 584</b>

### DATA NOTE

Subject to rounding error



# CHAPTER 7

## INTERNATIONAL COMPARISONS

### 7.1 Gross domestic expenditure on R&D (GERD)

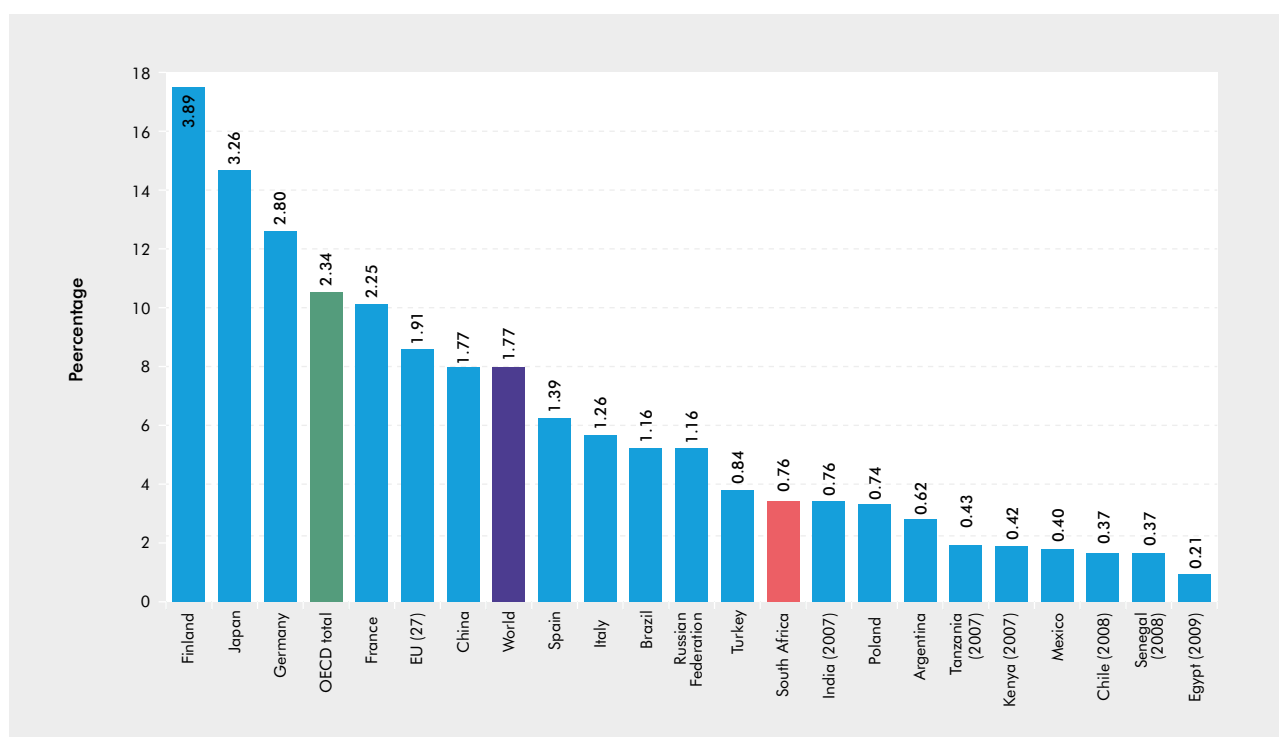
#### 7.1.1 GERD as a percentage of GDP

GERD as a percentage of GDP, at 0.76% in 2010/11, was below the world average of 1.77%. The latest available data for 2010 indicate that GERD as percentage of GDP averaged 2.34% in OECD countries and 1.91% in the European Union. Finland, with GERD as a percentage of GDP at 3.89%, Japan at 3.26% and Germany at 2.80% are among the few countries with R&D intensity of over 2.5% (Figure 7.1).

South Africa's R&D intensity compares with that of middle-income and developing countries such as Turkey (0.84%), India (0.76%) and Poland (0.74%). South Africa has the highest GERD as a percentage of GDP in Africa, where R&D intensity in most countries is below 0.5%.

Several other countries including the Russian Federation, China and Romania have also experienced a decline in GERD/GDP since 2008/09.

**Figure 7.1: GERD as a percentage of GDP for selected OECD and other countries (million current PPP\$, 2010)**



**DATA NOTE** Data are for 2010/11 or the latest available year.  
Calculations are based on current national currencies.

**DATA SOURCE** **Country data:**  
South Africa: National Survey of Research and Experimental Development, 2010.  
France, China, Spain, Italy, Russian Federation, Turkey, Poland, Argentina, Mexico, Chile: OECD (2011).  
Kenya, Senegal, Tanzania: AU-NEPAD (2010).  
Brazil, Egypt, India: UNESCO Institute for Statistics (2012a, b).

### 7.1.2 GERD for selected countries

The GERD values for selected countries in Africa, BRIC countries and the OECD for the period between 2007/08 and 2010/11 are presented in Table 7.1. The general trend (in some countries) is that, from 2007/08, GERD grew and peaked in 2008/09 or 2009/10 and dropped in 2010/11. In addition, the OECD and BRIC countries generally had higher GERD values than the African countries (where such data are available).

**Table 7.1: GERD for selected countries (million current PPP\$), 2007/08 to 2010/11**

COUNTRY	2007/08	2008/09	2009/10	2010/11
Argentina	2 669.28	3 002.00	3 467.19	3 980.21
Australia	*	19 133.00	*	20 150.71
Brazil	20 303.93	22 208.30	23 424.63	25 340.18
Chile	756.73	964.86	1 048.21	1 158.89
China	102 323.28	120 743.44	154 024.60	178 167.94
Finland	6 636.54	7 487.88	7 472.89	7 534.48
France	44 011.91	46 547.85	49 479.82	49 934.34
Germany	74 016.45	81 970.66	82 360.73	86 279.75
India	24 305.90	*	*	*
Italy	22 315.25	24 075.90	24 511.46	24 540.53
Japan	147 702.46	148 719.23	137 249.07	140 958.52
Kenya	241.51	*	*	*
Korea	40 722.52	43 906.41	47 082.41	53 242.99
Mexico	5 699.70	6 626.57	6 743.85	*
Poland	3 620.39	4 150.91	4 837.59	5 625.30
Russian Federation	26 553.68	30 058.39	33 506.55	32 787.93
Senegal	*	81.29	*	*
<b>South Africa</b>	<b>4 437.47</b>	<b>4 732.58</b>	<b>4 416.16</b>	<b>4 009.86</b>
Spain	18 314.88	20 414.94	20 440.24	20 232.48
Tanzania	212.96	*	*	*
Turkey	7 048.12	7 744.47	8 817.73	9 713.37
USA	380 088.00	406 258.00	405 072.00	408 657.00

**DATA NOTE** \* Data not available

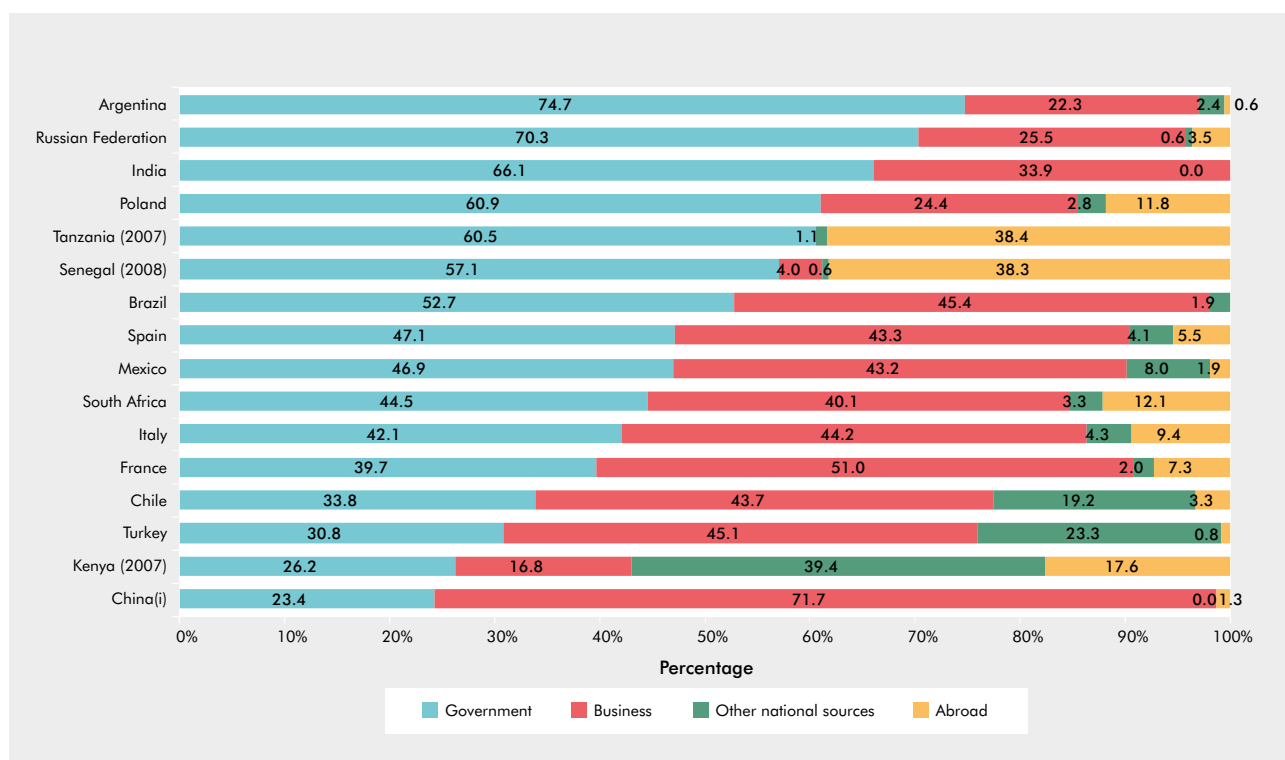
**DATA SOURCE** **Country data:**  
 South Africa: National Survey of Research and Experimental Development, 2007/08 - 2010/11.  
 Argentina, Australia, Brazil, Chile, China, Finland, France, Germany, Italy, Japan, Korea, Mexico, Poland, Russian Federation, Spain, Turkey, USA: OECD (2011).  
 Brazil, India, Kenya, Senegal, Tanzania: UNESCO Institute for Statistics (2012a, b)

### 7.1.3 GERD by source of funds

The composition of funding sources for R&D varies among countries. Gradual shifts also occur in the composition of funding sources as countries' economic, political and scientific landscapes change.

Among the countries featured in figure 7.2, Argentina has the largest proportion of GERD financed by government at 74.7%, followed by the Russian Federation at 70.3%, India at 66.1%, Poland at 60.9%, Tanzania at 60.5%, Senegal at 57.1% and Brazil at 52.7%. The countries with the lowest proportion of GERD financed by government are China at 23.4% and Kenya at 26.2%. China and France are the only two of the selected countries where business sector R&D expenditure exceeded 50% of GERD. R&D funding from abroad is generally high in African countries.

**Figure 7.2: GERD by source of funds in selected OECD and other countries (percentage), 2010/11**



#### DATA NOTE

Data are for 2010/11 or the latest available year.  
Other national sources include the not-for-profit and higher education sectors.

#### DATA SOURCE

##### Country data:

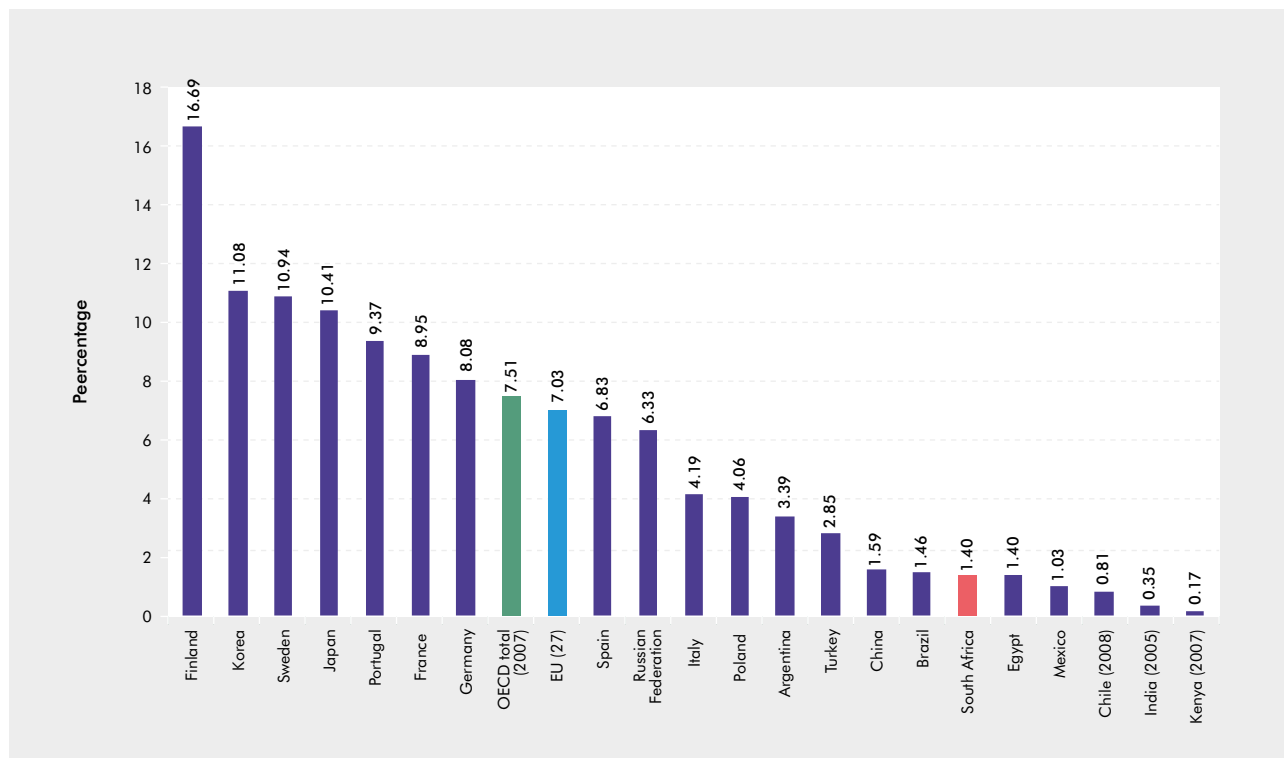
South Africa: National Survey of Research and Experimental Development, 2010/11.  
France, China, Spain, Italy, Russian Federation, Turkey, Poland, Argentina, Mexico, Chile: OECD (2011).  
Kenya, Senegal, Tanzania: African Union–NEPAD (2010).  
Brazil, India: UNESCO Institute of Statistics (2012a, b).

## 7.2 R&D personnel

### 7.2.1 Researchers per 1 000 in total employment (FTE)

South Africa has a relatively lower number of researchers FTE per 1 000 employed when compared with other developing countries such as Russian Federation, China and Argentina. The OECD and BRIC countries generally have more researchers than African countries.

Figure 7.3: Researchers FTE per 1 000 in total employment in selected countries, 2010/11

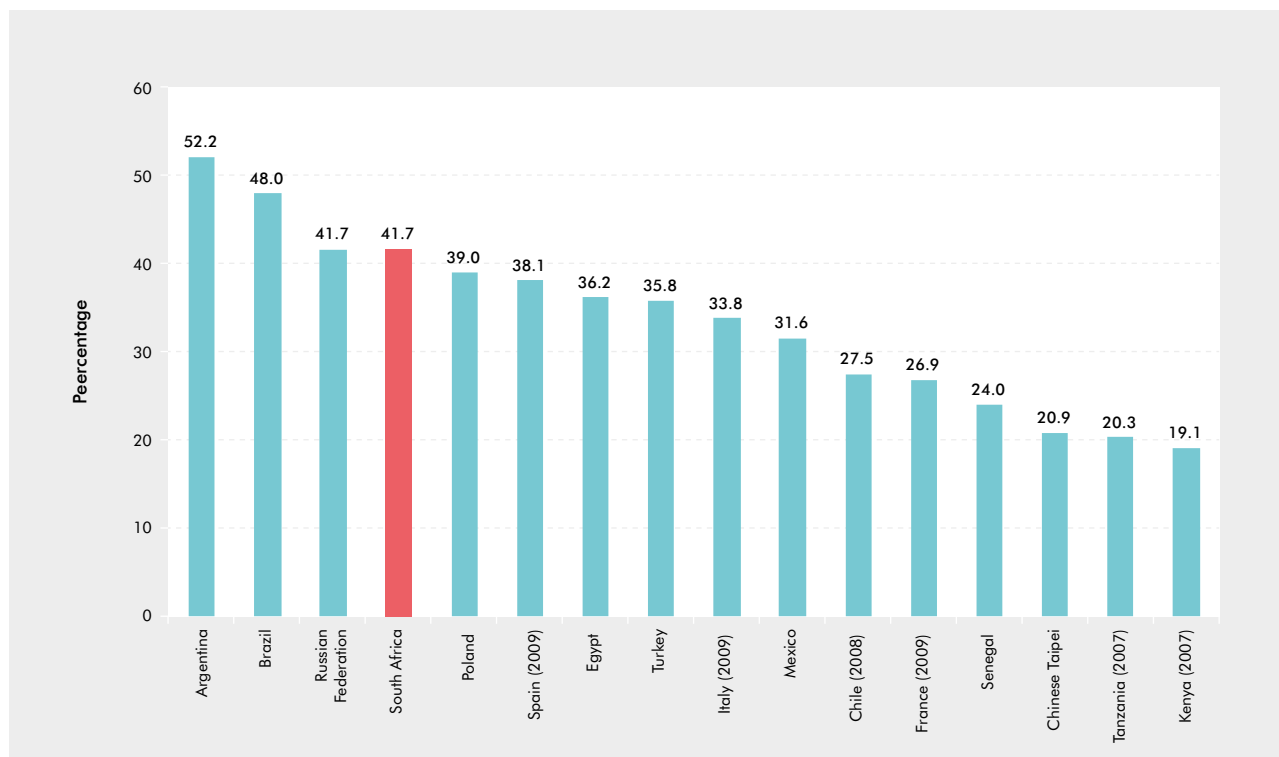


<b>DATA NOTE</b>	Data are for 2010/11 or the latest available year.
<b>DEFINITION</b>	Full-time equivalent (FTE) refers to the number of hours (in terms of person years of effort) spent on R&D activities.
<b>DATA SOURCE</b>	<b>Country data:</b> South Africa: National Survey of Research and Experimental Development, 2010/11. France, China, Spain, Italy, Russian Federation, Turkey, Poland, Argentina, Mexico, Chile: OECD (2011). Kenya, Senegal: African Union–NEPAD (2010). Brazil, Egypt, India: UNESCO Institute of Statistics (2012a, b).

### 7.2.2 Female researchers as a percentage of total researchers

South Africa performed well in comparison with OECD and other selected countries with regard to the proportion of female researchers. Of the selected countries, Argentina had the largest proportion of female researchers at 52.2%, followed by Brazil at 48.0%, and both the Russian Federation and South Africa at 41.7%.

**Figure 7.4: Female researchers as a percentage of total researchers (headcount) in selected OECD and other countries, 2010/11**



#### DATA NOTE

Data are for 2010/11 or the latest available year.  
Data are not available for China and India

#### DATA SOURCE

##### Country data:

South Africa: National Survey of Research and Experimental Development, 2010/11.  
France, Chinese Taipei, Spain, Italy, Russian Federation, Turkey, Poland, Argentina, Mexico, Chile: OECD (2011).  
Kenya, Senegal, Tanzania: African Union–NEPAD (2010).  
Brazil, Egypt: UNESCO Institute for Statistics (2012a, b).

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# ANNEXURE I

## NOTIFICATIONS

### Dissemination

This report, together with the Statistical Report, may be downloaded free of charge from:

- [www.dst.gov.za/index.php/resource-center/rad-reports](http://www.dst.gov.za/index.php/resource-center/rad-reports)
- [www.hsrc.ac.za/en/research-areas/Research\\_Areas\\_PHHSI/CeSTii/sa-national-survey-of-research-and-experimental-development](http://www.hsrc.ac.za/en/research-areas/Research_Areas_PHHSI/CeSTii/sa-national-survey-of-research-and-experimental-development)

### User Satisfaction Survey

A User Satisfaction Survey is included in **Annexure II** of this report. It would be very much appreciated if users could complete the questionnaire and return it by fax to +27 (0) 21 461 1255 or e-mail it to [sparker@hsrc.ac.za](mailto:sparker@hsrc.ac.za) or [nmustapha@hsrc.ac.za](mailto:nmustapha@hsrc.ac.za). Input from participants is considered for inclusion through an on-going feedback process following each survey to ensure the continued improvement of the R&D survey.

### Data extractions

Data extractions in response to users' special data requests are generally provided free of charge, unless fairly substantial analytical work is required to meet any such request. Such data extractions are done in accordance with the Human Sciences Research Council's approved data access protocol.

### Revisions

The Department of Science and Technology (DST), Statistics South Africa (Stats SA) and the Human Sciences Research Council's Centre for Science, Technology and Innovation Indicators (HSRC-CeSTII) jointly reserve the right to revise the data, indicators and analysis presented in this report. Such revisions may result from Stats SA revisions of national data series of gross domestic product (GDP) or amendments in response to internal or external data quality and consistency monitoring such as that done by the Organisation for Economic Cooperation and Development (OECD), which conducts quality checks through global comparative analysis, time series analyses and other methods. Explanations of any revisions will be made available and can be accessed on the DST and HSRC websites.



# ANNEXURE II R&D SURVEY QUESTIONNAIRE

STRICTLY CONFIDENTIAL



## NATIONAL SURVEY OF RESEARCH AND EXPERIMENTAL DEVELOPMENT (R&D) INPUTS: BUSINESS - 2010/11 FINANCIAL YEAR

Organisation	Please modify address label if necessary

### AUTHORITY

The Centre for Science, Technology and Innovation Indicators (CeSTII), within the Human Sciences Research Council (HSRC), conducts the Survey of Inputs into Research and Experimental Development (R&D) for the Department of Science and Technology (DST). The Survey is a component of Official Statistics, as defined in the Statistics Act No. 6 of 1999. As such, organisations are legally required to respond to this request for data. All data gathered for this survey is confidential. Only the survey team see individual organisation data. The HSRC and DST will not disseminate any information identifiable with an organisation without their consent.

### PURPOSE AND SCOPE OF SURVEY

The R&D survey collects data on the inputs into R&D activities performed **IN-HOUSE** in South Africa by all organisations (including Business, Government, Science Councils, Not-for Profit and Higher Education). The data is used for planning and monitoring purposes and for measuring international competitiveness. Previous survey results may be viewed at <http://www.hsrc.ac.za/CCUP-RnD-7.phtml>. This survey covers the Financial Year 1 March 2010 to 28 February 2011 (or your nearest complete financial year).

### DUE DATE

Kindly complete and return this questionnaire by ..... to: **R&D Survey, Private Bag X2, Vlaeberg 8018**

### ASSISTANCE

To assist you with queries kindly contact one of the survey managers:

Name	Contact Number	E-mail
Mr Saahier Parker	021 466 7814	sparker@hsrc.ac.za
Mr Julien Rumbelow	021 466 7834	jrumbelow@hsrc.ac.za
Mrs Irma Booyens	021 466 7822	ibooyens@hsrc.ac.za

**Mr. William Blankley**  
Research Director: CeSTII  
Human Sciences Research Council

### DETAILS OF PERSON COMPLETING THE QUESTIONNAIRE:

Name (with title)		Tel	(     )
Designation		Fax	(     )
Date (dd-mm-yyyy)		Cell	(     )
Sign		E-mail	

## THE FOLLOWING DEFINITIONS ARE IMPORTANT IN THE COMPLETION OF THE SURVEY QUESTIONNAIRE: WHAT IS R&D?

### Definition

This survey follows the approach of the Organisation for Economic Co-operation and Development (OECD), which defines Research and Experimental Development (R&D) as:

- **Research** is creative work and original investigation undertaken on a systematic basis to gain new knowledge, including knowledge of humanity, culture and society.
- **Development** is the application of research findings or other scientific knowledge for the creation of new or significantly improved products, services or processes.

The basic criterion for distinguishing R&D from related activities is the presence in R&D of an appreciable element of novelty and the resolution of scientific and/or technological uncertainty, i.e. when the solution to a problem is not readily apparent to someone familiar with the basic stock of commonly used knowledge and techniques in the area concerned.

### Examples:

Investigating electrical conduction in crystals is basic research; application of crystallography to the properties of alloys is applied research.

New chip designs involve development.

Investigating the limiting factors in chip element placement lies at the border between basic and applied research, and increasingly involves nanotechnology.

Much services R&D involves software development where the completion of the project is dependent on a scientific or technological advance and the aim of the project is the systematic resolution of a scientific or technological uncertainty.

### Scope of survey

- The survey requests data performed IN-HOUSE by your organisation on the national territory of South Africa.
- Part five asks some questions on “out-sourced R&D”

### R&D Includes – but is not limited to:

Activities of personnel who are obviously engaged in R&D. In addition include:

- The provision of professional, technical, administrative or clerical support and/or assistance to personnel directly engaged in R&D
- Management of personnel who are either directly engaged in R&D or are providing professional, technical or clerical support to those performing R&D
- Software development where the aim of the project is the systematic resolution of a scientific or technological uncertainty
- Research work in the biological, physical and social sciences, and the humanities
- Social science research including economic, cultural, educational, psychological and sociological research
- Research work in engineering and the medical sciences
- R&D projects performed for other parties
- “Feedback R&D” directed at solving problems occurring beyond the original R&D phase, for example technical problems arising during initial production runs.

### R&D Excludes:

The following ROUTINE activities are excluded, except where they are an essential part of in-house R&D activity:

- Scientific and technical information services
- Engineering and technical services
- General purpose or routine data collection
- Standardisation and routine testing
- Feasibility studies (except into R&D projects)
- Specialised routine medical care, for example routine pathology services
- The commercial, legal and administrative aspects of patenting, copyrighting or licensing activities
- Routine computer programming, systems work or software maintenance where there are no technological uncertainties to be resolved.

## PART 1: GENERAL INFORMATION

1a. Registered name of Company

1b. Trading as (if applicable)

2a. If you are reporting R&D for subsidiary companies (e.g. as a head office with several subsidiary companies), please list the companies below (append a page if required).


2b. List the principal activities and/or Standard Industrial Classification (SIC) code (see Appendix A in code book) from which your company derives its main income.

Activities	SIC	Company Income Obtained (%)

3. Parent Company (if applicable) with % ownership

	%
--	---

4. Approximate foreign/local ownership split (By ultimate ownership if complex holding structures exist.)

EU	%
USA	%
Other	%
South Africa	%
TOTAL	100%

5. Financial year (dd/mm/yyyy) for which you are reporting in this survey

From	to
------	----

6. Total number of all employees (include staff on contract for six months or longer)

--	--	--	--	--	--	--	--

7. Gross Sales Revenue or Turnover (R'000 Excl. VAT)

--	--	--	--	--	--	--	--

8a. Did the company make use of the enhanced tax allowance for R&D in its annual return to SARS?

(Please tick)

Yes

☐

No

☐

If YES state the date of the Annual Return (mm/yy)

## 8b. International purchases and sales of technology and technological 'know-how'

**NB! This question asks for "General Information" about your company (as per other Part 1 questions). This question is not focussed on 'in-house R&D' only (as per Part 2, 3 and 4 questions – in the main body of this questionnaire).**

### International flows (purchases / sales) of technology and technical know-how?

This question measures international flows of industrial property and know-how.

Please **include** purchases or sales on the following operations: patents; licences for patents; know-how (not patented); models and designs; trademarks (including technology franchising); technical services; finance of industrial R&D outside national territory.

Please **exclude** purchases or sales on the following operations: commercial, financial, managerial and legal assistance; advertising; insurance; transport; films, recordings, material covered by copyright; design; software.

(R'000 Excl. VAT)

**Purchases of technology and know-how from outside SA:**

--	--	--	--	--	--	--

**Sales of technology and know-how to outside SA:**

--	--	--	--	--	--	--

- *In-house R&D refers to R&D performed by the reporting unit on its own behalf or on behalf of the others.*
- *It excludes R&D projects funded by this organisation but carried out by others using their own facilities.*
- *In-house R&D must be distinguished from outsourced R&D which should be reported under part 5.*
- *Only R&D performed in **South Africa** should be recorded.*

## 8c. Did the company perform any IN-HOUSE R&D in South Africa during the financial year?

Yes

☐

Continue with Question 9 - 20

No

☐

Proceed to Part 5: Question 19 and 20 on Outsourced R&D

☐

If your company does *not* do any In-House and/or any Outsourced R&D, tick this box and return the questionnaire as a NIL response.

## PART 2: IN-HOUSE R&D PERSONNEL

**Report for all R&D personnel, permanent and contract (6 months or longer).**

### Researchers

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the planning and management of the projects concerned.

### Technicians directly supporting R&D

Persons doing technical tasks in support of R&D, normally under the direction and supervision of a Researcher.

### Other personnel directly supporting R&D

Other supporting staff includes skilled and unskilled crafts persons, secretarial and clerical staff participating in R&D projects or directly associated with such Projects.

**NOTE:** Do not include personnel **indirectly** supporting R&D: Typical examples are transportation, storage, cleaning, repair, maintenance and security activities, as well as administration and clerical activities undertaken not exclusively for R&D (such as the activities of central finance and personnel departments).

Allowance for these should be made under overheads in R&D expenditure (current expenditure – Question 11 D) but such persons should not be included as R&D Personnel.

## 9. HEADCOUNT OF R&D PERSONNEL

**Provide the headcount of all R&D personnel according to categories below**

Personnel Categories and Highest Qualification	African		Coloured		Indian		White		Subtotal		TOTAL
	M	F	M	F	M	F	M	F	M	F	

### Researchers (incl. Research Executives and Research Managers)

Doctorates											
Masters/Hons/Bachelors or equivalent											
Diplomas and other qualifications											
<b>RESEARCHER TOTAL</b>											

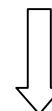
### Technicians /Technologists

Doctorates											
Masters/Hons/Bachelors or equivalent											
Diplomas and other qualifications											
<b>TECHNICIAN TOTAL</b>											

### Other personnel directly supporting R&D

Doctorates											
Masters/Hons/Bachelors or equivalent											
Diplomas and other qualifications											
<b>TECHNICIAN TOTAL</b>											

Carry subtotals over to Q 10



## 10. HEADCOUNTS, FULL -TIME EQUIVALENTS (FTEs) AND LABOUR COST OF R&D PERSONNEL

Provide an estimate of Person Years of effort on R&D (or Full Time Equivalents), according to the categories below.

### CALCULATING 'FULL TIME EQUIVALENT' (FTE) PERSONS

Note: For the purpose of this survey, an employee can work a maximum of 1 FTE in a year.

The following equation can be used to calculate person years of effort on R&D:

(Full time equivalent) x (Portion of the year the person spent on R&D) x (Portion of their job spent on R&D)  
= Person years of effort on R&D

For example:

-a **full time** employee who devotes **100%** of their time to R&D

$1 \times 1 \times 1 = 1$  person years on R&D

-a **full time** employee spending **40%** of his/her time on R&D during **half** of the survey year:

$1 \times 0.4 \text{ persons} \times 0.5 \text{ years} = 0.2 \text{ person years of R\&D effort}$

-a **part-time** employee working **40%** of a full time year doing only R&D

$0.4 \times 1 \times 1 = 0.4 \text{ FTE to the R\&D effort.}$

-20 **full-time** male researchers spending **40%** of their time on R&D during the survey year:

$20 \times 0.4 \times 1 = 8$

NOTE: please calculate FTEs for all R&D personnel

R&D Personnel Categories	Headcounts (From Q9)			Total Full Time Equivalents (FTE's)			Average annual labour cost per person  R'000 (Excl. VAT)  (B)	Calculated labour cost of R&D  R'000 (Excl. VAT)  (A x B)
	M	F	Total	M	F	Total (A)		
Researchers (incl. Research Executives and Research Managers)								
Technicians directly supporting R&D								
Other personnel directly supporting R&D								
TOTAL LABOUR COST OF R&D								

Carry over total calculated labour cost of R&D  
personnel to Question 11C



## PART 3: IN-HOUSE R&D EXPENDITURE

### 11. ALLOCATE IN-HOUSE R&D EXPENDITURE AS FOLLOWS

#### CAPITAL EXPENDITURE ON R&D

<ul style="list-style-type: none"> <li>The full value of capital expenditure must be reported in the year of purchase (do not depreciate).</li> <li>If the asset has been/will be used for more than one activity, include an estimate of the portion used for R&amp;D.</li> </ul>	
<b>Including - but not limited to:</b> <ul style="list-style-type: none"> <li>Expenditure on fixed assets used in the R&amp;D projects of your business.</li> <li>Acquisition of software for R&amp;D, including fees, expected to be used for more than one year.</li> <li>Purchase of databases expected to be used for more than one year.</li> <li>Major repairs and improvements on land and buildings used for R&amp;D.</li> </ul>	<b>Excluding:</b> <ul style="list-style-type: none"> <li>Other repairs and maintenance expenses.</li> <li>Depreciation provisions.</li> <li>Proceeds from the sale of R&amp;D assets.</li> </ul>

		R'000 (Excl. VAT)						
Vehicles, plant, machinery and equipment	<b>A</b>							
Land, buildings and other structures	<b>B</b>							

#### LABOUR COSTS OF R&D PERSONNEL

		R'000 (Excl. VAT)						
Labour costs of R&D (To match Question 10)	<b>C</b>							

#### OTHER CURRENT EXPENDITURE ON R&D

<b>Including - but not limited to:</b> <ul style="list-style-type: none"> <li>Materials, fuels and other inputs (including all running costs).</li> <li>Water, electricity and other overhead expenses.</li> <li>Repair and maintenance expenses.</li> <li>Payments to outside organisations for use of specialised testing facilities.</li> <li>Payments to outside organisations for analytical work, engineering or other specialised services in support of R&amp;D projects carried out by your business.</li> <li>Commission/consultant expenses for research projects carried out by your business.</li> <li>Other R&amp;D expenses and indirect costs not specified in 11 A, B or C.</li> </ul>	<b>Excluding:</b> <ul style="list-style-type: none"> <li>R&amp;D activities where the research project is carried out elsewhere by others on behalf of your business.</li> <li>Payments for purchases of technical know-how.</li> <li>Payments for patent searches.</li> <li>Depreciation provisions.</li> </ul>
---	--

		R'000 (Excl. VAT)						
Other Current Expenditure	<b>D</b>							

		R'000 (Excl. VAT)						
<b>TOTAL R&amp;D EXPENDITURE (A + B + C + D = E)</b>	<b>E</b>							

## 12. ESTIMATED FUTURE R&D EXPENDITURE:

Please estimate future in-house R&D expenditure:

In-House R&D (Report in R'000 Excl. VAT)													
2011/12							2012/13						

## 13. SOURCES OF FUNDS OF IN - HOUSE R&D

Provide a breakdown of the total R&D expenditure (as reported in Question 11) according to sources of funds.

Company	R'000 (Excl. VAT)						
Own funds							

### Government (includes Science Councils e.g. CSIR, Departments and Institutes)

Grants (including SPII, Innovation Fund etc)							
Contracts to perform R&D							

### Other Local Businesses

Contracts to perform R&D							
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### Other South African Sources

Not-for-Profit Organizations (including Foundations)							
Individual Donations							
Higher Education							

### Foreign

Parent Company							
Foundations							
All other foreign sources							

	R'000 (Excl. VAT)						
TOTAL R&D EXPENDITURE (to equal Question 11E)							



#### 14. PROVINCIAL EXPENDITURE ON R&D

Please state the location where your company carried out R&D activities and the percentage of the total R&D expenditure.

- Specify where R&D is actually performed, rather than where it is managed/financed from.

Eastern Cape	
Free State	
Gauteng	
KwaZulu-Natal	
Limpopo	

Mpumalanga	
Northern Cape	
North-West	
Western Cape	
<b>TOTAL</b>	<b>100%</b>

#### PART 4: CATEGORIES OF IN-HOUSE R&D EXPENDITURE

##### 15. IN-HOUSE R&D CURRENT EXPENDITURE BY TYPE OF R&D.

Specify the percentage of total IN-HOUSE LABOUR COSTS and OTHER CURRENT R&D expenditure by type of R&D.

###### Basic Research

- Work undertaken primarily to extend the boundaries of disciplinary knowledge.
- The analysis of properties, structures and relationships with a view to formulating and testing hypotheses, theories or laws.
- The results of basic research are usually published in peer-reviewed scientific journals.

Percentage		

###### Applied Research

- Original investigation to acquire new knowledge with a specific application in view.
- Activities that determine the possible uses for the findings of basic research.
- The results of applied research are intended primarily to be valid for a single or limited number of products, operations, methods or systems.
- Applied research develops ideas into operational form and may be published in peer-reviewed journals or subjected to other forms of intellectual property protection.

Percentage		

###### Experimental Development

- Systematic work using existing knowledge for creating new or improved materials, products, processes or services, or improving substantially those already produced or installed.

Percentage		

<b>TOTAL</b>	<b>1</b>	<b>0</b>	<b>0</b>
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**16. Classify R&D according to Standard Industrial Classification (SIC).**  
(See Appendix A in code book) with associated percentage expenditure.

- SICs indicate the classification that best describes company R&D according to the intended **use** of the product.

SIC Codes						Percentage		SIC Codes						Percentage	
SIC								SIC							
SIC								SIC							
SIC								SIC							
SIC								SIC							
SIC								SIC							
<b>Total</b>								<b>1</b>	<b>0</b>	<b>0</b>					

**17a. RESEARCH FIELD (RF)**

**Classify R&D according to Research Fields (RF) with associated percentage expenditure.**  
(See Appendix B in code book.)

- The RF Codes are based on recognised academic disciplines and emerging areas of study.

RF Codes						Percentage		RF Codes						Percentage	
RF								RF							
RF								RF							
RF								RF							
RF								RF							
RF								RF							
<b>Total</b>								<b>1</b>	<b>0</b>	<b>0</b>					

**17b. MULTI-DISCIPLINARY R&D**

**Please estimate the percentage of R&D expenditure allocated to the following areas:**

- Multi-disciplinary R&D combines several research fields or disciplines. If your organisation performs such R&D, as described below, please provide the applicable percentage of total R&D Expenditure.
- Note that the percentages will most likely not total 100%.

**DEFINITIONS**

**Biotechnology** is application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

**Nanotechnology** is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering and technology. Nanotechnology involves imaging, measuring, modelling, and manipulating matter at this length scale.

Multidisciplinary Area of R&D	Percentage of R&D expenditure
Biotechnology	
Nanotechnology	

**No Multi-Disciplinary R&D in these areas**

☐

← TICK if no such R&D is done

## 17c. R&D IN SPECIFIC AREAS OF INTEREST

Please estimate the percentage of R&D expenditure allocated to the following areas:

- National Policy and the National R&D Strategy emphasise the importance of certain areas of R&D.
- Some of these Specific Areas are listed below. If your organisation performs R&D in these areas, please provide the applicable % of total R&D Expenditure.
- Note that the percentages will most likely not total 100%.

Specific Areas of Interest	Percentage of R&D expenditure
Open source software	
New materials	
Tuberculosis (TB), HIV/AIDS, Malaria	

No R&D in these areas	<input type="checkbox"/>
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← TICK if no such R&D is done

## 18. Classify R&D according to Socio-economic objectives with associated percentage expenditure. (See Appendix C in code book.)

- The SEO classification provides an indication of the main beneficiary of your R&D activities.

SEO Codes					
S					
S					
S					
S					
S					

Percentage		

SEO Codes					
S					
S					
S					
S					
S					

Percentage		

Total						1	0	0
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## PART 5: R&D OUTSOURCED / CONTRACTED OUT

### Outsourced R&D refers to:

- Outsourced or extramural expenditures being the amounts a reporting unit paid or committed to pay to another organisation for the performance of R&D during a specific period.
- This includes acquisition of R&D performed by and/or grants given to other organisations for performing R&D

19. If the amount stated in question 19 or 20 is in excess of 1 million Rands, please indicate the name of the organisation(s) that conducted the outsourced R&D with the associated expenditure.

State details of R&D outsourced inside South Africa.

Outsourced to:	Approximate Value R'000 (excl. VAT)

State details of R&D outsourced outside South Africa.

Outsourced to:	Approximate Value R'000 (excl. VAT)

## COLLABORATIVE R&D

### 20a. With whom is R&D conducted in partnerships, alliances or collaboration?

**Note:**

In the table below, a single project may be counted with several collaborative partners in the 'Number of R&D projects' column only.

R&D Expenditure must reflect the expenditure with the specific partner only.

R&D Expenditure may refer to in-house or out-sourced R&D expenditure on collaborative R&D

	SOUTH AFRICAN PARTNERS		FOREIGN PARTNERS	
	Expenditure (R '000)	Number of R&D projects	Expenditure (R '000)	Number of R&D projects
Higher Education Institutions				
Science Councils (e.g. CSIR, Mintek)				
Government Research Institutes				
Members of own company/ Affiliated Co's				
Other Companies (incl. consultants)				
Not-for-profit organisations				
<b>TOTALS</b>				
<b>NO COLLABORATION (please tick)</b>	<input type="checkbox"/>		<input type="checkbox"/>	

### 20b. Please state the number of R&D projects by your company:

	R&D Projects with NO COLLABORATION	R&D Projects with COLLABORATION			Total number of R&D Projects
		with South African Partners only	with Foreign Partners only	with both SA and Foreign Partners	
<b>Number of R&amp;D Projects</b>					

**THANK YOU FOR YOUR TIME AND EFFORT**

# ANNEXURE III

## USER SATISFACTION SURVEY: R&D MAIN RESULTS REPORT

In order to improve the quality and relevance of the R&D statistics it would be useful to receive the views of users of this publication. It would therefore be appreciated if you could complete the following questionnaire and return by fax to +27 (0)21 461 1255 or e-mail to [nmustapha@hsr.ac.za](mailto:nmustapha@hsr.ac.za) or [sparker@hsr.ac.za](mailto:sparker@hsr.ac.za).

### 1. Name and address of respondent:

Name and title	
Designation/ occupation	
Name and address of organisation or enterprise	

### 2. Which of the following describes your area of work? Mark with 'X'.

Government		International organisation	
Private enterprise		Media	
Public enterprise		Not-for-profit organisation	
Academic or research institution		Other, specify	

### 3. In which country do you work?

--

### 4. What is your assessment of the contents of this publication?

☐ Excellent
 ☐ Good
 ☐ Average
 ☐ Satisfactory
 ☐ Poor

### 5. How useful is this publication for your work?

☐ Extremely useful
 ☐ Very useful
 ☐ Useful
 ☐ Partly useful
 ☐ Not at all useful

### 6. How accurate is the picture of R&D in your sector or research field(s) as presented in this publication?

☐ Very accurate
 ☐ Fairly accurate
 ☐ Unsure
 ☐ Not very accurate
 ☐ Not at all accurate

### 7. How easy was it to find specific information that you required in the publication?

☐ Extremely easy
 ☐ Very easy
 ☐ Easy
 ☐ Not very easy
 ☐ Not at all easy

8. What information (i.e. tables, text or figures) were of most interest to you? Please be as specific as possible e.g. provide table, page or figure numbers.

9. What did you like best about the publication?

10. Provide any comments or recommendations for the improvement of the publication.

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