HIGH-level key results

National **Survey** of Research and Experimental Development (2008/09 Fiscal Year)

HSRC
Human Sciences Research Council

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Department: Science and Technology
REPUBLIC OF SOUTH AFRICA

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CONTENTS

* or latest year available

Preface

The National Survey of Research and Experimental Development (R&D) has become a regular feature of South Africa's science and technology landscape. The Survey is conducted annually by the Human Sciences Research Council's Centre for Science, Technology and Innovation Indicators (CeSTII) on behalf of the Department of Science and Technology (DST).

The South African R&D Survey gathers data under strict conditions of confidentiality from institutions in the country that perform R&D. The data is then aggregated at sector level and provides essential information for planning at system and institutional level and also provides key indicators of national competitiveness. The R&D Surveys involve the collection of primary data from the public and private sectors. The public sector includes universities, science councils and government department-based research institutes, while the private sector includes firms and non-profit organisations.

The R&D Survey is carried out in accordance with international best practice as recommended by the guidelines of the Organisation for Economic Cooperation and Development (OECD) Frascati Manual 2002. The results are submitted to the OECD and published in the authoritative biannual OECD Main Science and Technology Indicators (MSTI) series. They are also a component of South African official statistics as defined in the Statistics Act, 1999.

The 2008/09 National Survey of Research and Experimental Development (R&D) recorded gross domestic expenditure on R&D (GERD) of R21,0 billion, which was a nominal increase of R2,4 billion from the R18,6 billion recorded for 2007/08. The 2008/09 expenditure represents a 13,0% nominal increase over that of the previous year, but was insufficient to keep up with the increase in the nominal Gross Domestic Product (GDP) of 14,2% over the corresponding period. As a consequence, R&D expenditure, expressed as a percentage of GDP, dropped slightly from 0,93% in 2007/08 to 0,92% in 2008/09. This means the increase in national R&D expenditure for 2008/09 was not enough to reach the target of 1% of GDP set for this year.

The survey revealed some encouraging signs. Both the business and higher education sectors had real (after inflation) R&D expenditure increases of 3,0% and 3,7% respectively. However, R&D expenditure increases in the government sector (including the science councils) and non-profit sector were below the inflation rate. Nevertheless, in real terms, total R&D expenditure in the country increased by 1,3% between 2007/08 and 2008/09.

In view of government's commitment to greatly increase R&D expenditure in the country this presents a challenge particularly in the current global economic climate. The number of full-time equivalent (FTE) researchers increased only very slightly from 19 320 in 2007/08 to 19 384 in 2008/09. However, because of the increase in total employment in South Africa the number of researchers per 1 000 total employment is down from 1,5 in 2007/8 to 1,4 in 2008/09 and total R&D personnel per 1000 total employment is down from 2,4 in 2007/08 to 2,2 in 2008/09.

We extend our appreciation to the CeSTII project team for their efforts in conducting this extensive survey each year. A special word of thanks goes to all the survey respondents in the higher education sector, science councils, and the government and non-profit sectors. The business sector plays a crucial role in South African R&D and the many senior executives from this sector who give their time so readily to make this survey a success are sincerely thanked.

G.N.M. Pandor

Mrs GNM Pandor, MP
Minister of Science and Technology

Note on Methodology

This publication comprises the high-level results of the 2008/09 Research and Experimental Development (R&D) Survey. This survey follows the Frascati Manual Guidelines developed by the Organisation for Economic Co-operation and Development (OECD). These guidelines provide best practice advice on how to define research and experimental development and the boundaries between the different R&D performers.

The 2008/09 R&D Survey comprised a census across Higher Education institutions, department based research institutes and Science Councils, and purposive surveys across not-for-profit organisations and the business sector. In keeping with previous practice, state owned enterprises that sell their goods or services at market prices are included in the business sector.

The R&D Surveys are a component of Official Statistics and protected under the Statistics Act No. 6 of 1999. This imposes strict requirements on the survey regarding the confidentiality of responding organizations.

The Department of Science and Technology (DST), Statistics South Africa (Stats SA), the Human Sciences Research Council (HSRC) and the R&D project team reserve the right to collaboratively revise data, indicators and analyses, if deemed necessary, to improve the quality of this product. Revisions of data may arise from both internal and external data quality and consistency checks or amendments. Revisions to this publication may also result from changes in external data such as Stats SA revisions of national data series, for example Gross Domestic Product (GDP) estimates.

The full results of the 2008/09 R&D Survey will be available at http://www.dst.gov.za/publications-policies/strategies-reports and www.hsrc.ac.za/CCUP-RnD-8.phtml.

More detailed data extracts beyond the above and that conform to the required standard of confidentiality are available on request to HSRC CeSTII.

Table 1

Key figures

INDICATOR	VALUE	
	2007/08	2008/09
Gross domestic expenditure on R&D - GERD (Rand Millions)	18 624.0	21 041.0
Gross domestic product (GDP) at market prices (Rand Millions)	1 999 086	2 283 822
GERD as a percentage of GDP	0.93	0.92
Total R&D personnel (FTE) [a]	31 352	30 802
Total researchers (FTE) [b]	19 320	19 384
Total researchers per 1000 total employment (FTE)	1.5	1.4
Total R&D personnel per 1000 total employment (FTE)	2.4	2.2
Civil GERD as a percentage of GDP	0.87	0.87
Total researchers (headcount)	40 084	39 955
Women researchers as a percentage of total researchers	40.3	39.7

a FTE = Full Time Equivalent
b Following OECD practice, doctoral students are included as researchers

Sources: South African National R&D Surveys and Statistics South Africa P0441 Gross Domestic Product, First Quarter 2010

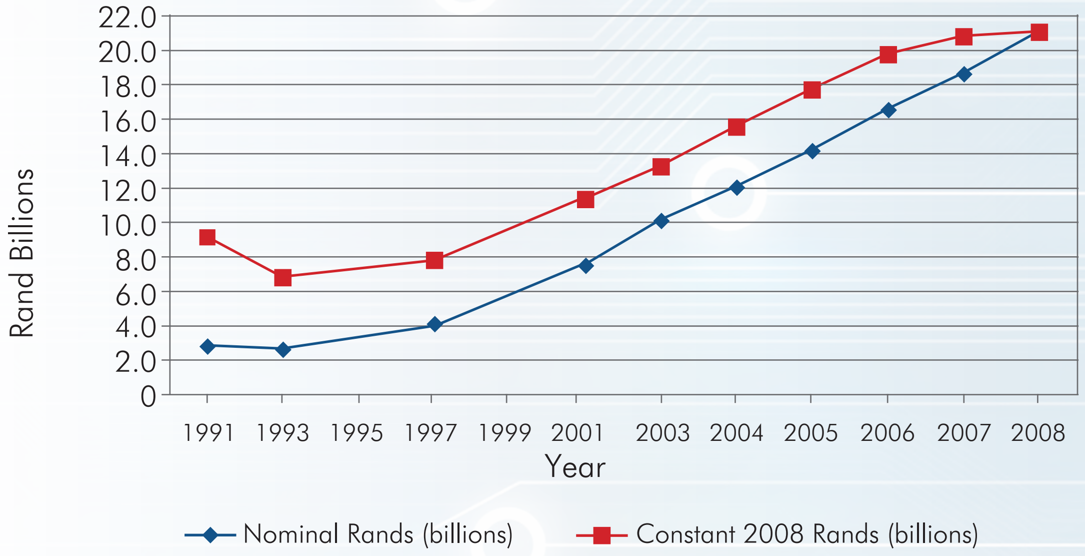
R&D expenditure in South Africa has been showing a steady growth in both nominal and real terms since 1993. Between 2007/08 and 2008/09 total R&D expenditure increased from R18.624 billion to R21.041 billion which is a nominal annual increase of about 12.9% and an increase of 1.3% in real terms.

SOURCE:
South African National Research and Experimental Development Surveys 2007/08 and 2008/09

NOTE:
National R&D surveys were conducted on a biennial basis between 1991 and 2003 with the exception of 1995 and 1999. Since 2003 the National R&D survey is undertaken on an annual basis.

Figure 1

Gross Expenditure on R&D (GERD)
(South Africa, 1991-2008

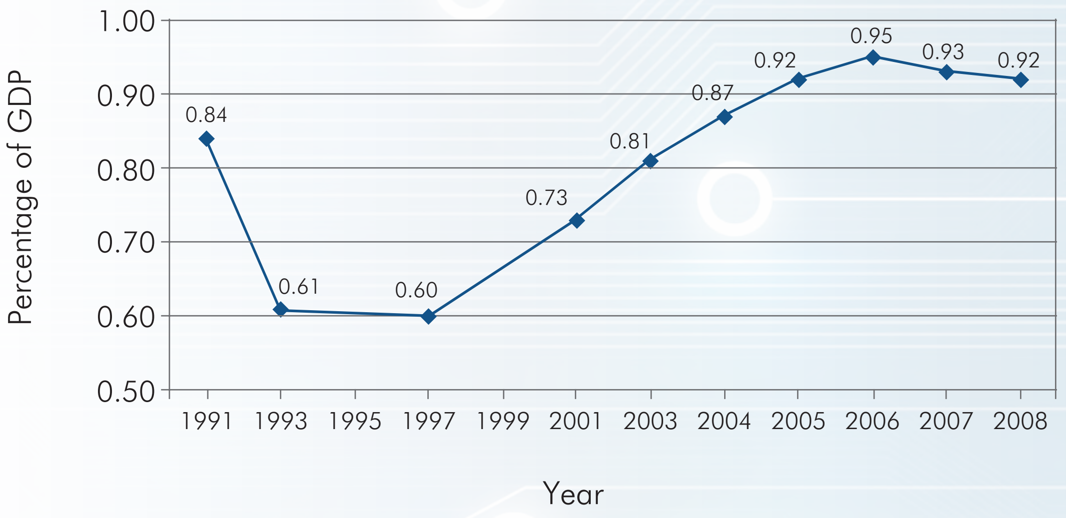


Gross national expenditure on R&D (GERD) expressed as a percentage of GDP provides an indication of the concentration or intensity of R&D in an economy. There has been a steady increase in GERD as a percentage of GDP from 0.60% in 1997/98 to 0.95% in 2006/07.
The 2007/08 survey results showed a slight decrease in R&D intensity with a recorded figure of 0.93% and a further drop of 0.01% to 0.92% of GDP in 2008/09

SOURCE:
South African National R&D Surveys and Statistics South Africa P0441 Gross Domestic Product, Fourth Quarter 2009.

Figure 2

Gross Expenditure on R&D as a percentage of GDP
(South Africa, 1991-2008



South Africa's GERD as a percentage of GDP now stands at 0.92%. Few OECD countries have a GERD equivalent to less than 1.0% of GDP. Leading countries in R&D expenditure such as Sweden, Finland, Japan and Korea have R&D expenditures exceeding 3.0% of GDP.

SOURCE:
International comparisons – OECD Main Science and Technology Indicators, (2009/02 Edition). Data for India are from UNESCO Institute for Statistics (UIS).

Figure 3

Gross Expenditure on R&D as a percentage of GDP 2008* (*or latest year available)

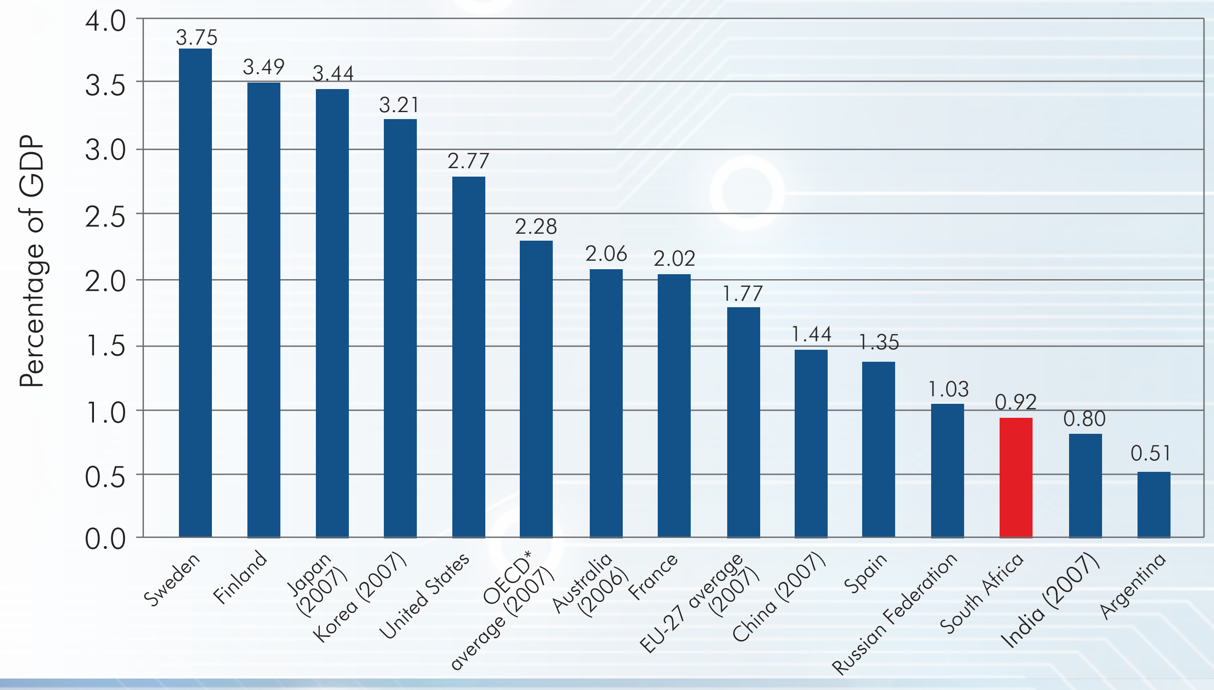


Table 2

GERD of selected countries in billion current PPP$ 2006-2008

International comparison in Dollar Purchasing Power Parity (US$PPP) estimates shows that South Africa has grown its R&D expenditure from US$4.3 billion in 2007 to US$4.6 billion in 2008. The Unites States of America (USA), Japan and China are the three biggest R&D spenders worldwide.

	GERD (billion current PPP$)		
	2006	2007	2008
Sweden	11.7	12.1	12.9
Finland	5.9	6.4	6.6
Japan	138.9	147.8	..
Korea	35.9[g]	41.7[a]	..
United States	347.7[i]	373.1[i]	398.1[ip]
Total OECD*	829.2[b]	889.9[b]	..
Australia	15.3	..	..
France	41.2	42.5[p]	42.8[p]
Total EU-27	247.0[b]	263.6[b]	..
China	86.7	102.3	..
Spain	15.6	18.0	19.5
Russian Federation	20.2	23.5	23.4
South Africa	4.1	4.3	4.6
India**	22.0	24.8	..
Argentina	2.3	2.7	..

* Organisation for Economic Cooperation and Development

** Data from UNESCO Institute for Statistics

OECD Notes

[a] Break in series with previous year for which data is available.

[b] Secretariat estimate or projection based on national sources.

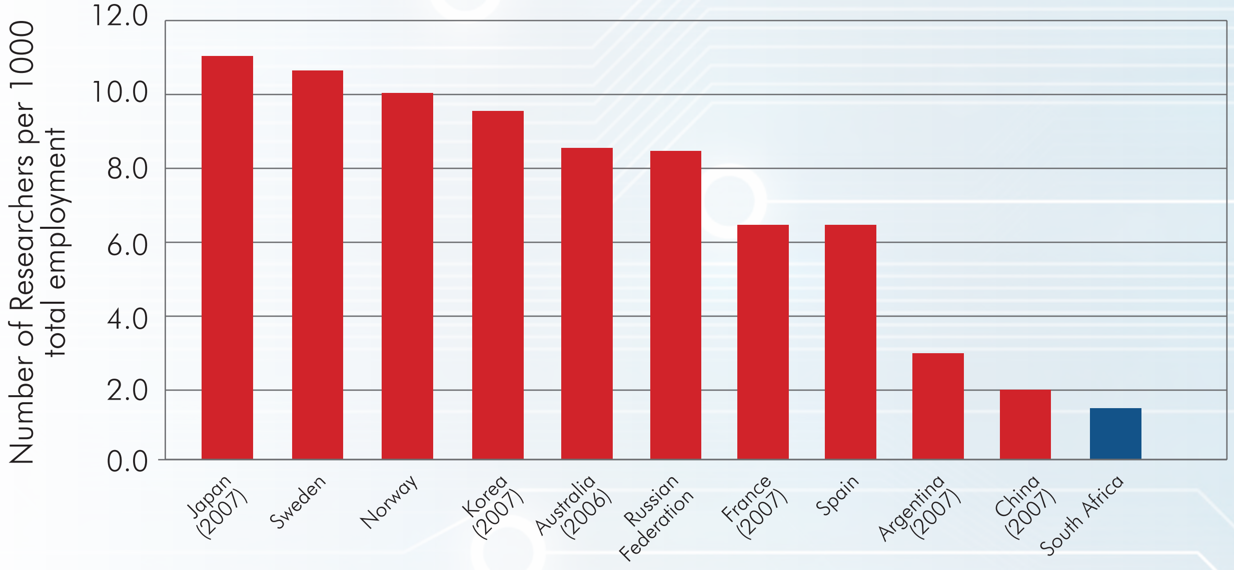
[g] Excluding R&D in the social sciences and humanities.

[i] Excludes most or all capital expenditure.

[p] Provisional.

Figure 4

Number of Full Time Equivalent (FTE) researchers per 1000 total employment in 2008*
*or latest year available

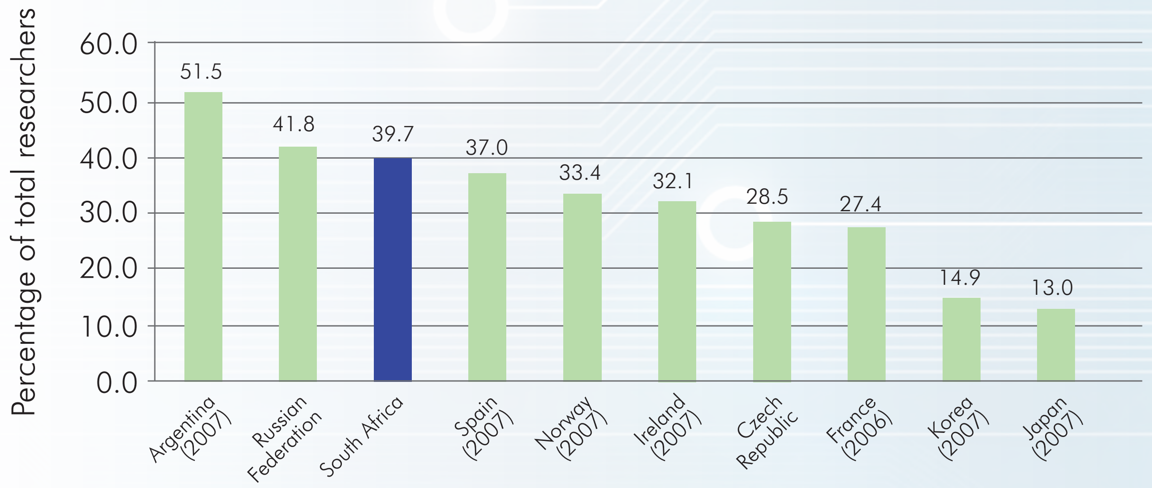


The number of women researchers as a percentage of total researchers in South Africa is relatively static and remains at 39.7%. Argentina and the Russian Federation continue to lead with women researchers comprising 51.5% and 41.8% of total researchers, respectively.

SOURCE:
International Comparisons – OECD Main Science and Technology Indicators (2009/2 Edition)

Figure 5

Women researchers as a percentage of total researchers (headcount) 2008*
*or latest year available

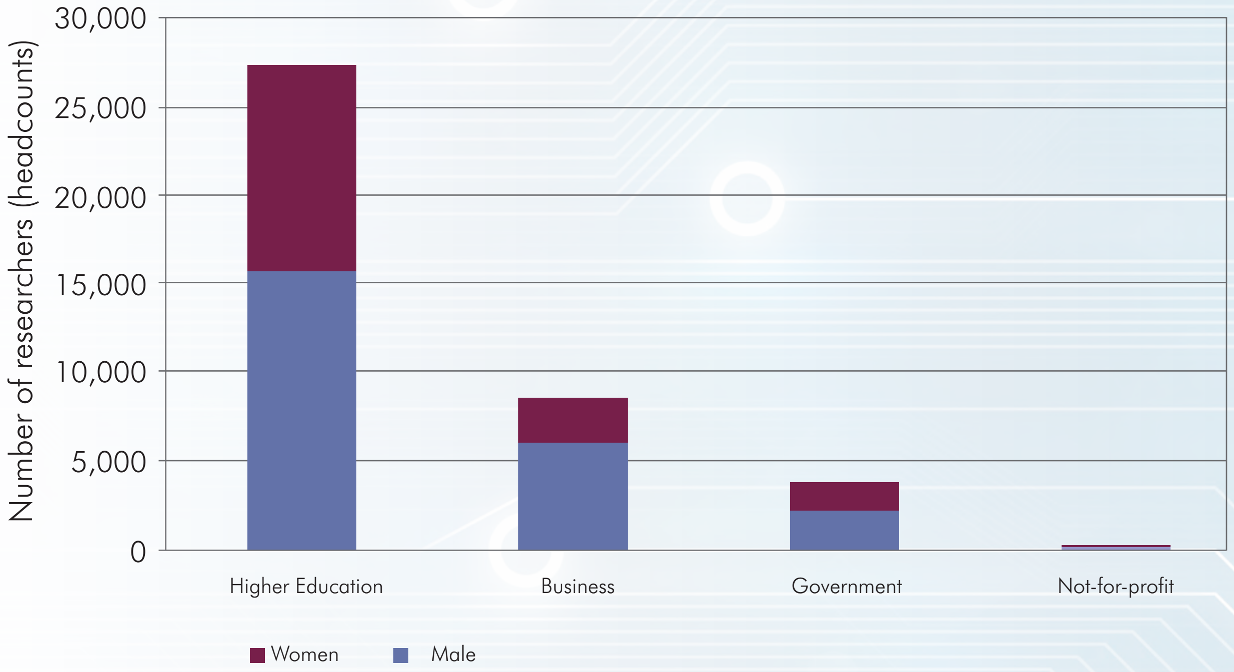


The higher education sector is the largest in terms of researchers with 11 616 women researchers and 15 700 male researchers and accounts for over 73% of women researchers in South Africa. While the not-for-profit sector employs the highest percentage of women researchers (46.6%) the number of researchers employed is less than one percent of the total. In government (including the science councils) women comprise 41.4% of researchers. The business sector employs fewer women researchers but their representation increased slightly from 28.9% in 2007/08 to 29.5% in 2008/09.

SOURCE:
South African National Research and Experimental Development Survey 2008/09.

Figure 6

Numbers of women and male researchers (headcounts) per sector (South Africa 2008/09)

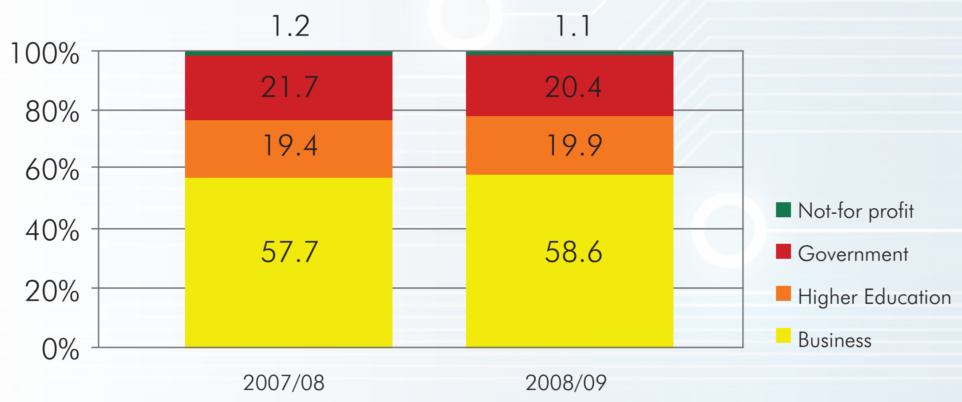


There has been an overall increase in R&D expenditures across all the sectors. For the 2008/09 period the business sector accounted for 58.6% of R&D performance in South Africa, followed by the government (including the science councils) at 20.4%. Government's share of total R&D expenditure decreased by about 1.3%. Higher education's share of R&D performance increased slightly by 0.5%. The not-for-profit sector's share of R&D performance continued to drop, from 1.2 % of the total in 2007/08 to 1.1% in 2008/09.

SOURCE:
South African National Research and Experimental Development Survey 2007/08 and 2008/09

Figure 7

Performance of R&D by Sector
(South Africa, 2007/08 & 2008/09)



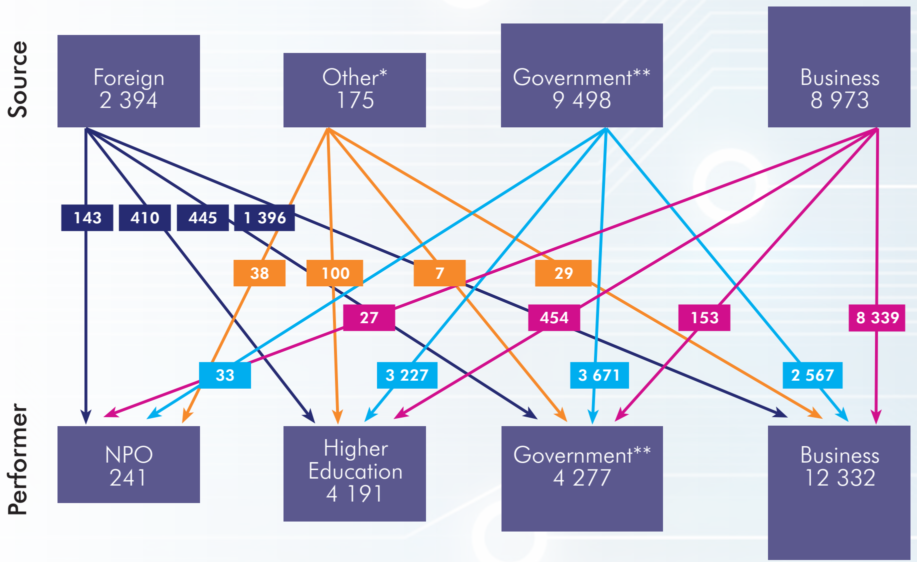
Expenditure (R 000s)	Business	Higher Education	Government	Not-for Profit	Total
2007	10 738 456	3 621 862	4 040 493	223 202	18 624 013
2008	12 332 012	4 191 366	4 277 019	240 649	21 041 046

The business sector continues to be the largest performer of R&D, spending about R12.3 billion in 2008/09. This indicates an increase over the previous year of about 14.8% in nominal terms. Government (including the science councils) is the second largest performer at R4.3 billion, followed by higher education at R4.2 billion. Since 2007/08 the government has been the largest funder of R&D in South Africa, contributing about 45.1% towards the total expenditure. The business sector contribution stood at 42.7%, the same as in 2007/08. Foreign funding of R&D has increased from about R2.0 billion in 2007/08 to R2.4 billion in 2008/09 which is an increase of almost 20.5%.

SOURCE:
South African National Research and Experimental Development Survey 2007/08 and 2008/09.

Figure 8

Major flows of funding for R&D, 2008/09 (R millions)



* Other includes contributions from Higher Education, Not-for-profit organisations and individual donations

** Government includes Science Councils

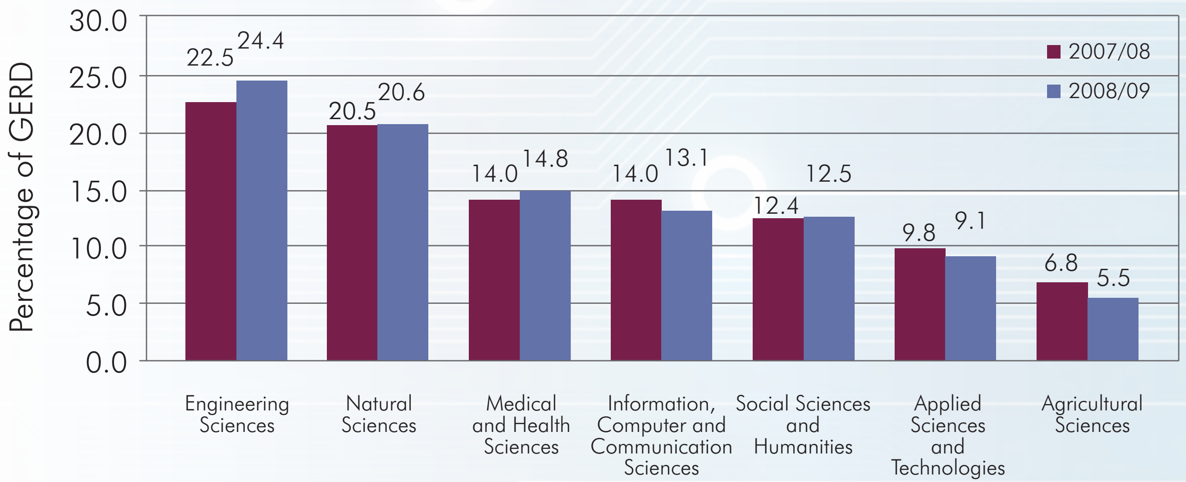
Note:
Totals may differ due to rounding

R&D expenditure in the engineering sciences increased from 22.5 % of total R&D expenditure in 2007/08 to 24.4% in 2008/09. The expenditure in the natural sciences and social sciences and humanities remained relatively stable at 20.6% and 12.5% respectively. Expenditure on R&D in the medical and health sciences increased slightly by 0.9% while the agricultural sciences' share of expenditure has decreased by 1.3%. Applied sciences and technologies and information, computer and communication technologies all showed decreased shares of R&D expenditure during the 2008/09 survey period.

SOURCE:
South African National Research and Experimental Development Surveys 2007/08 and 2008/09

Figure 9

Expenditure on R&D by major research field (South Africa, 2007/08 & 2008/09)



R&D expenditure in applied research accounted for 33.3% of total R&D expenditure in 2008/09. This indicates a decrease of 0.9% between 2007/08 and 2008/09. The share of R&D expenditure devoted to basic research decreased slightly by about 0.4%. R&D expenditure on experimental development accounts for the largest portion of expenditure comprising 46.5% of total R&D expenditure in 2008/09.

SOURCE:
South African National Research and Experimental Development Surveys 2007/08 and 2008/09

Figure 10

Gross Expenditure on R&D by type of R&D (South Africa, 2007 & 2008)

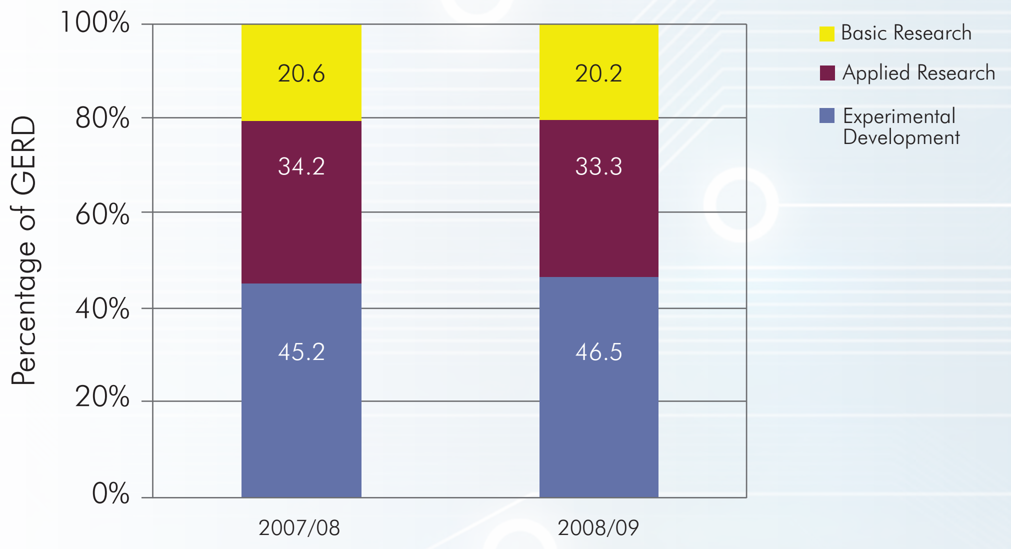


Table 3

Expenditure on basic research
(million current PPP$)

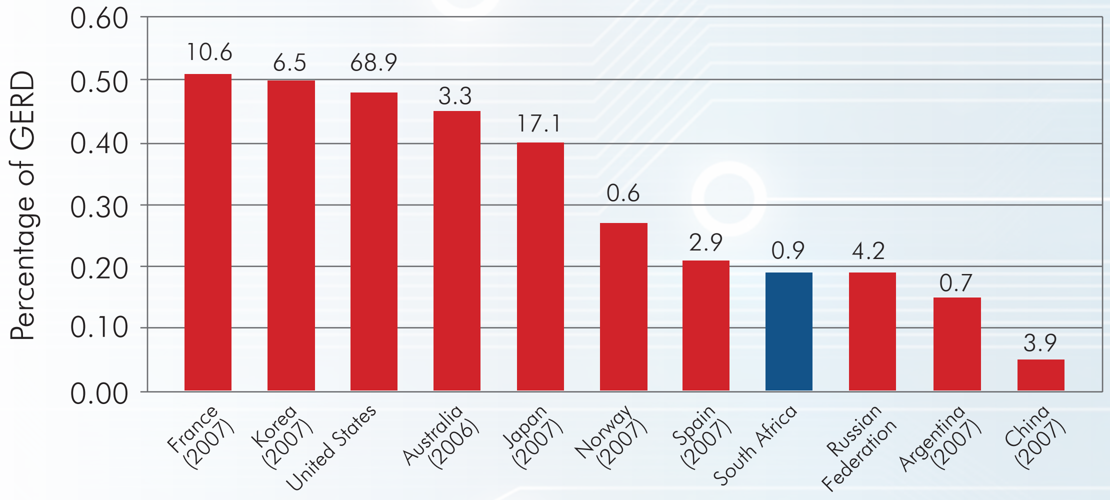
	Basic research expenditure (million current PPP$)
France (2007)	10,611
Korea (2007)	6,501
United States	68,973
Australia (2006)	3,342
Japan (2007)	17,174
Norway (2007)	679
Spain (2007)	2,983
South Africa	935
Russian Federation	4,299
Argentina (2007)	784
China	3,952

Basic research expenditure (as a percentage of GDP) is an indicator that signals the R&D capacity that is responsive to new challenges and new knowledge. South Africa's expenditure on basic research remained the same as in 2007/08 (0.19% of GDP). Most of the countries shown have had a relatively stable percentage of GDP devoted to basic research over the past few years. France has one of the highest basic research intensities in the world but the huge expenditure on basic research ($70 billion) by the United States overshadows other countries.

SOURCE:
International comparisons – OECD Main Science and Technology Indicators, (2009/02 Edition)

Figure 11

Basic Research as a percentage of GDP 2008/09*
*or latest year available



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