DEPARTMENT OF SCIENCE AND TECHNOLOGY

National Survey of Research and Experimental Development (R&D)
(2004/05 Fiscal Year)

HIGH-LEVEL KEY RESULTS

science & technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Department of Science and Technology

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* or latest year available

PREFACE

The 2004/05 National Survey of Research and Experimental Development (R&D) is the second such survey to be conducted under the aegis of the single focus Ministry of Science and Technology.

The 2004/05 Survey involved about seven months of fieldwork, yet was able to draw in more respondents than the 2003/04 Survey. The increased response is the result of improved survey capability and capacity, and the interest and commitment of many organisations and firms that were approached to provide the required information. Coverage of the business sector represented a 38% improvement over the 2003/04 Survey in terms of the number of responding firms. Accordingly, we are confident that our measurement and understanding of the extent of R&D activity in our country is significantly improving year by year. The 2004/05 R&D Survey reveals that our national R&D expenditure of R12.0 billion amounts to 0.87% of GDP. This is a very encouraging figure and is the highest level ever reached by our country. Based on the levels of the 2001/02 and 2003/04 Surveys, the system of innovation is showing a real 5% growth per annum over the period 2001 to 2004. Attaining the goal of 1% of GDP by 2008 as targeted in our R&D Strategy is thus within striking distance.

We fully expect that the R&D tax incentives announced in the 2006/07 Budget Speech of the Minister of Finance will contribute both to higher levels of R&D expenditure and improved reporting in the 2006/07 Survey.

The full results of the 2004/05 R&D Survey will be disseminated in mid-2006 at www.hsrc.ac.za/RnDSurvey. The results of the previous two R&D Surveys are already available on this website.

Two significant achievements were attained in July 2005. The first was the declaration of the R&D data series from

2001 onwards as a component of Official Statistics in terms of the Statistics Act (Act No. 6 of 1999).

The second is the inclusion of our country R&D data in the authoritative OECD *Main Science and Technology Indicators* and the OECD *Science, Technology and Industry Scoreboard*. Because of the stringent data submission process that the OECD requires, the information presented in these publications provides important objective measures of South Africa's relative competitiveness in the international community.

In addition, the National Advisory Council on Innovation (NACI) has just completed a report towards the OECD Peer Review of our national system of innovation.

We now conduct the R&D Survey annually. The next survey will cover the period 2005/06. We are expecting the first large-scale Innovation Survey results commissioned by the Department later this year.

The Centre for Science, Technology and Innovation Indicators (CeSTII) of the Human Sciences Research Council carries out these surveys for the Department. We extend our appreciation to the CeSTII project team. A special word of thanks goes to all the survey respondents in the higher education sector, science councils, government, not-for-profit sectors and the many senior executives in the business sector who gave so readily of their time to make this survey the most comprehensive ever.

Mosibudi Mangena
Minister of Science and Technology
Cape Town, 22 June 2006

A NOTE ON METHODOLOGY

This publication comprises the high-level results of the 2004/05 Research and Experimental Development Survey. This survey follows the Frascati Manual Guidelines developed by the Organisation for Economic Cooperation 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 2004/05 survey comprised a census across Higher Education institutions, Science Councils and government departments and purposive surveys for the not-for-profit and business sectors. In the case of the business sector the response rate shows significant improvement on that of 2003/04. It is anticipated that there will be yet further improvement in response rate in the next survey for 2005/06.

TABLE 1: KEY FIGURES

INDICATOR	VALUE	
	2003/04	2004/05
Gross domestic expenditure on R&D – GERD (Rand millions)	10 082.6	12 010.0
GERD as a percentage of GDP	0.81	0.87
Total R&D personnel (FTE)[a]	25 185	29 692
Total researchers[b] (FTE)	14 129	17 910
Total researchers per 1000 total employment[c] (FTE)	1.2	1.6
Total R&D personnel per 1000 total employment (FTE)	2.2	2.6
Civil GERD as a percentage of GDP	0.72	0.80
Total researchers (headcount)	30 703	36 979
Women researchers as a percentage of total researchers	38.0	38.3

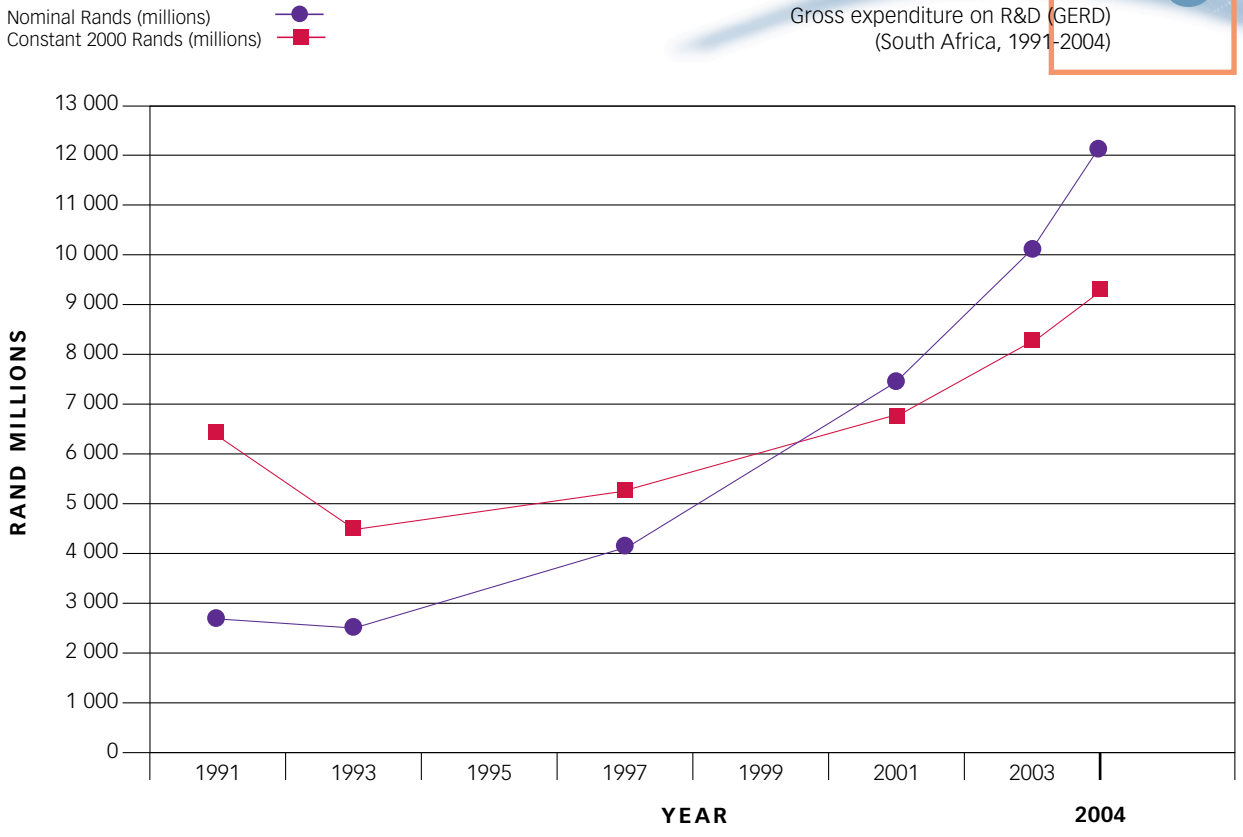
[a] FTE = Full Time Equivalent
[b] Following OECD practice, doctoral students are included as researchers
[c] Following OECD practice, total employment is now provided by the International Labour Organisation based on the Labour Force Surveys of Statistics South Africa and is not restricted to the formal non-agricultural sectors as previously reported.

Since 2001, R&D expenditure has grown in both nominal and real terms. Between 2003/04 and 2004/05 total R&D expenditure in South Africa grew from just over 10 billion Rand to 12 billion Rand in nominal terms representing a real annual increase of about 12.8%. This increase is partly due to improved survey coverage, particularly of the business and higher education sectors as well as increased funding from government sources. The growth of the South African economy since 2002 also appears to be stimulating an increase in R&D activities.

SOURCE: South African National R&D Surveys
NOTE: National R&D surveys were not undertaken in 1995 and 1999

Fig 1:

Gross expenditure on R&D (GERD)
(South Africa, 1991-2004)

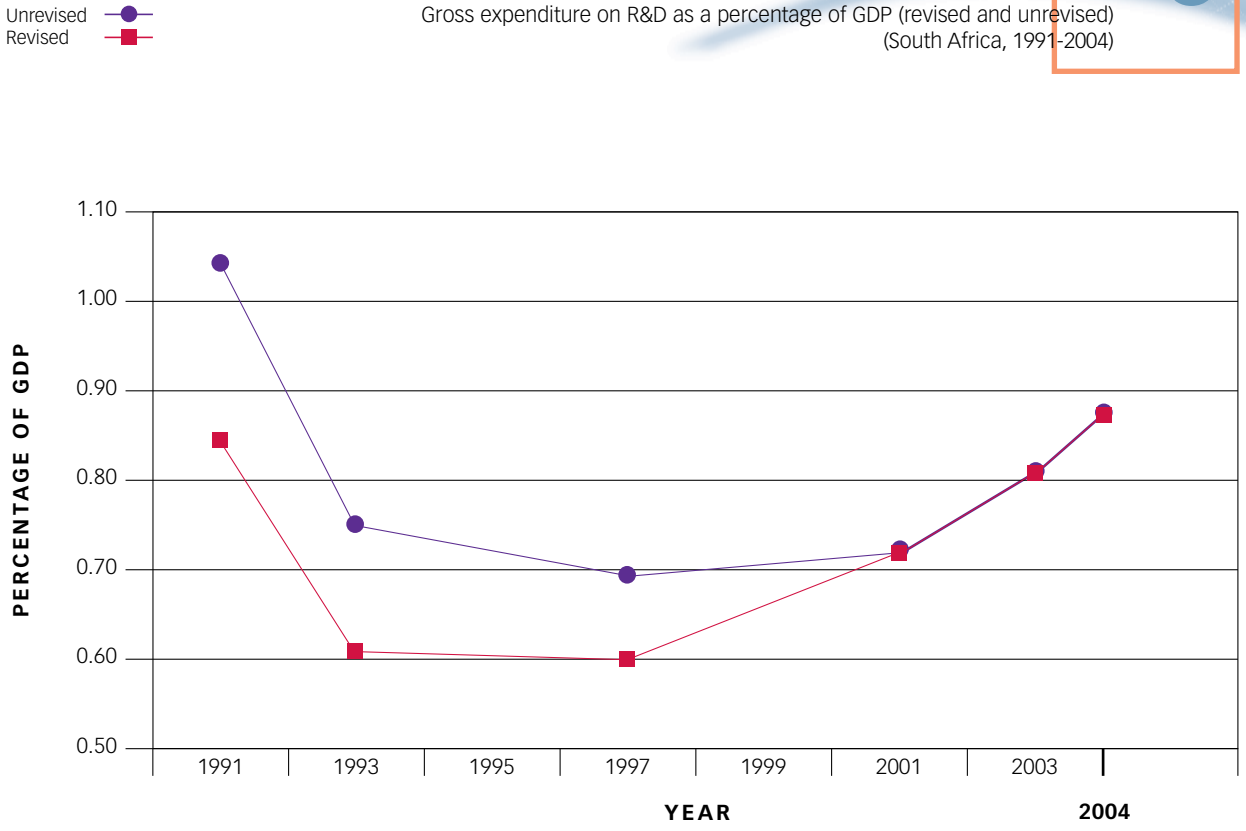


The increase in gross expenditure on R&D (GERD) in real terms between 2001 and 2004 has resulted in a 5% annual growth of GERD expressed as a percentage of GDP. Because of the revised South African GDP data series, the historic high point of R&D expenditure of 1.04% of GDP in 1991 has been reviewed downwards to 0.84%. This means that the 0.87% recorded for 2004/05 is the peak in the South African R&D data series. However, the challenge to reach the R&D expenditure goal of 1% of GDP by 2008 remains.

SOURCE: South African National R&D Surveys and Statistics South Africa

Fig 2:

Gross expenditure on R&D as a percentage of GDP (revised and unrevised)
(South Africa, 1991-2004)



South African GERD as a percentage of GDP has increased between 2001 and 2004. China remains the country with the fastest growing research intensity, reflecting an increase from 1.07% of GDP in 2001 to 1.44% of GDP in 2004.

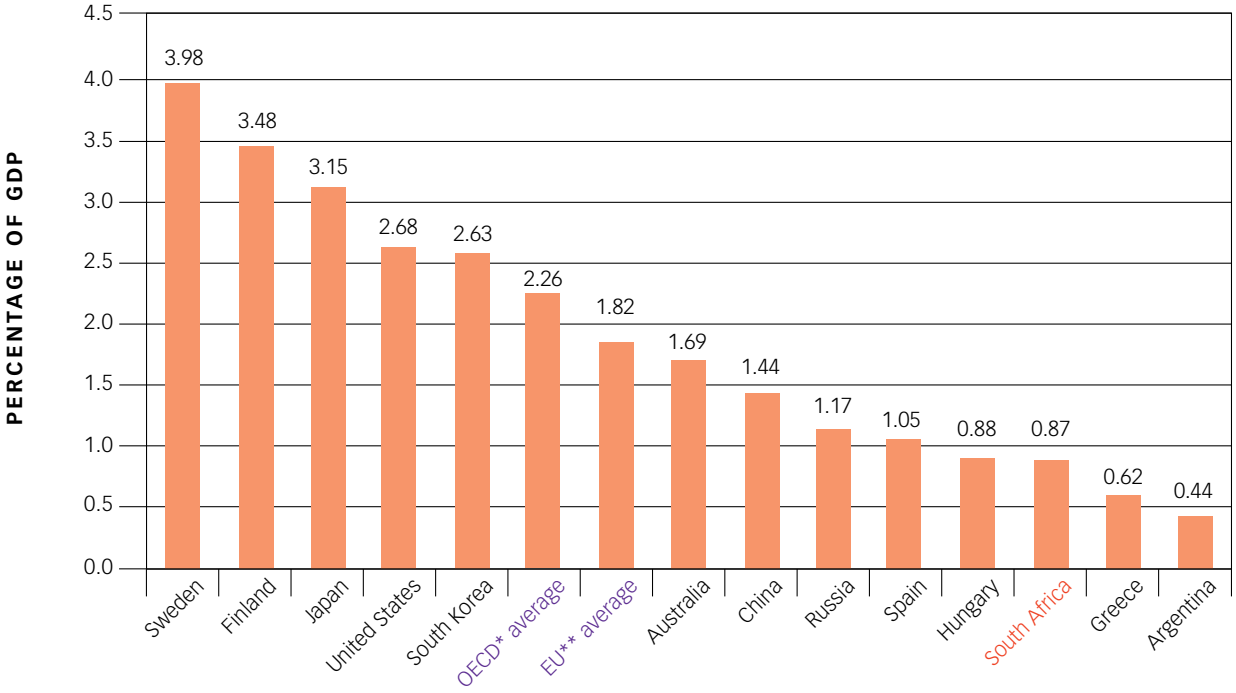
SOURCE: International comparisons – OECD Main Science and Technology Indicators, (2005/2 Edition)

Fig 3:

Gross expenditure on R&D as a percentage of GDP 2004*
(International Comparisons)

*or latest year available

* Organisation for Economic Cooperation and Development
**Expanded European Union (25 states)



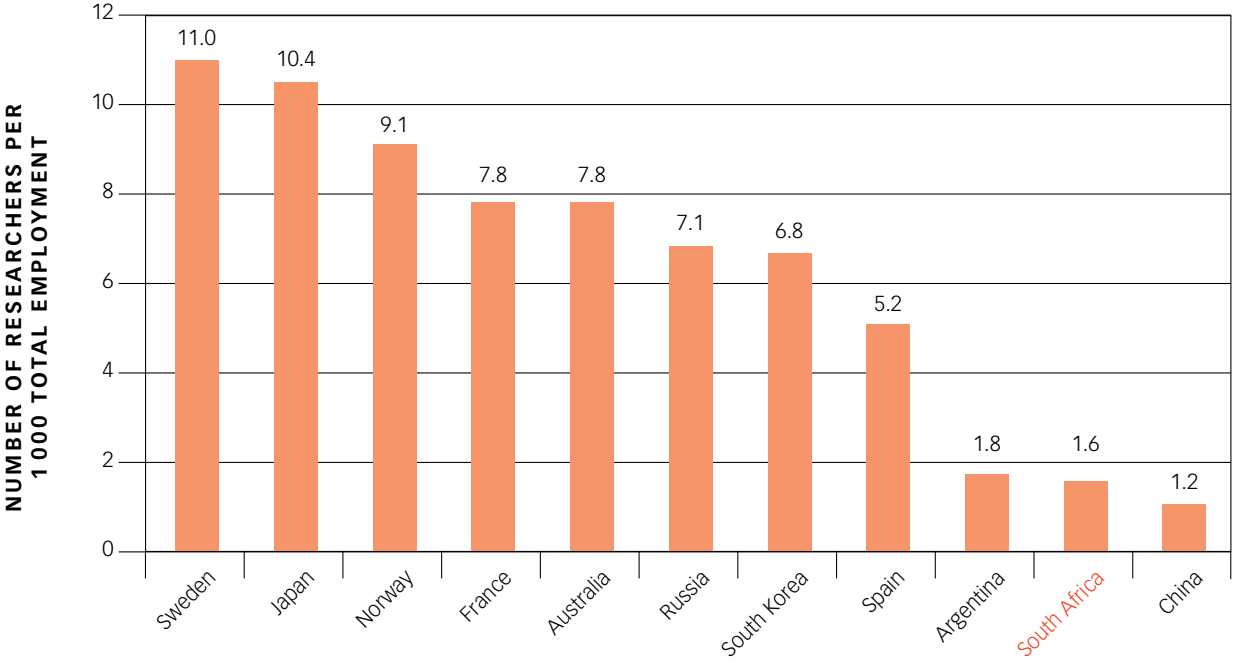
At a level of 1.6 FTE researchers per 1 000 total employment (across all economic sectors), South Africa has a relatively low number of researchers when compared with other countries that provide data to the OECD. The 2004/05 survey indicated a total of 17 910 FTE researchers in South Africa, of which approximately 38% comprised doctoral students and post-doctoral fellows.

SOURCE: International comparisons – OECD Main Science and Technology Indicators, (2005/2 Edition)

Fig 4:

Number of Full Time Equivalent (FTE) researchers per 1000 total employment in 2004* (International Comparisons)

*or latest year available



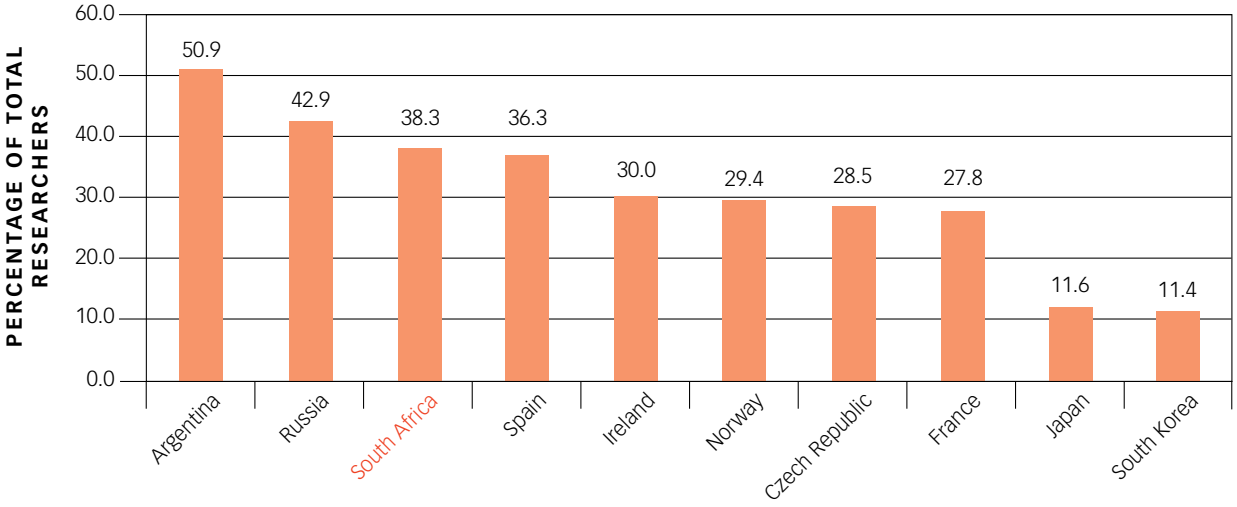
Between 2001 and 2004 women researchers as a percentage of total researchers in South Africa increased slightly by 3.4%. Of those countries that provide data on women in R&D, Argentina and Russia continue to lead the way, while countries such as South Korea and Japan still lag behind.

SOURCE: International Comparisons – OECD Main Science and Technology Indicators (2005/2 Edition)

Fig 5:

Women researchers as a percentage of total researchers (headcount) 2004* (International Comparisons)

*or latest year available

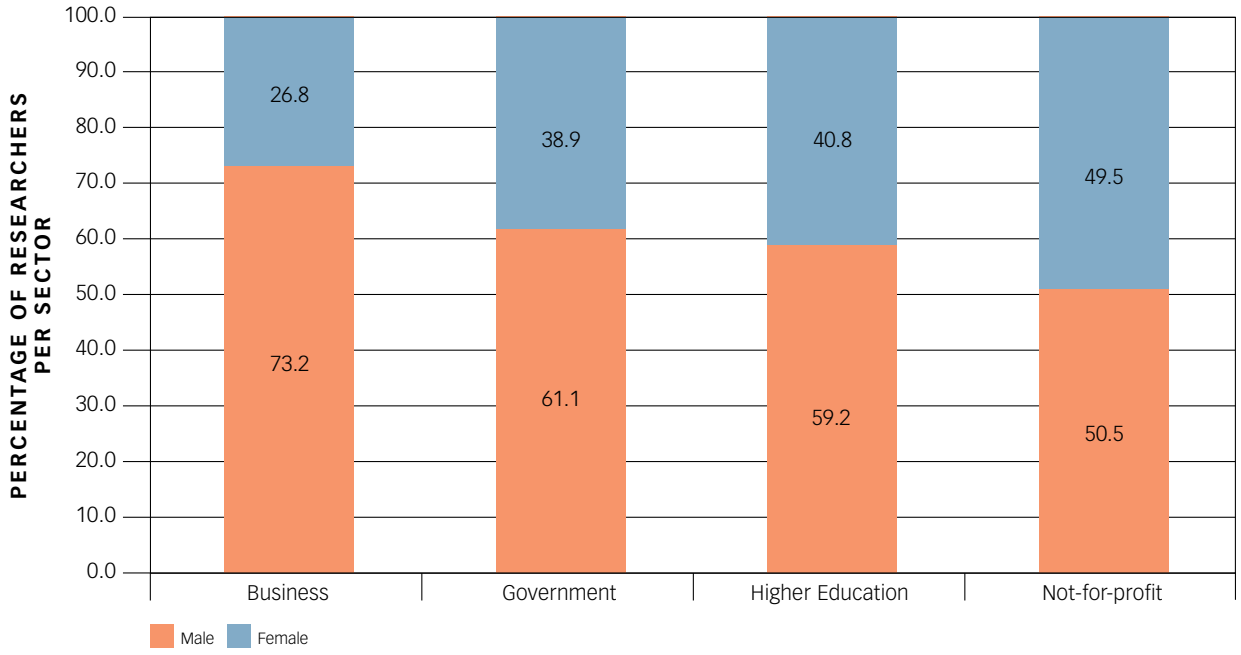


When comparing the percentage of women researchers across the various sectors in South Africa, disparities become evident. The not-for-profit sector has the largest percentage of women researchers, followed by the higher education sector, government (including the Science Councils) and the business sector.

SOURCE: South African National Research and Experimental Development Survey 2004/05

Fig 6:

Women researchers as a percentage of total researchers (headcount) per sector (South Africa, 2004)

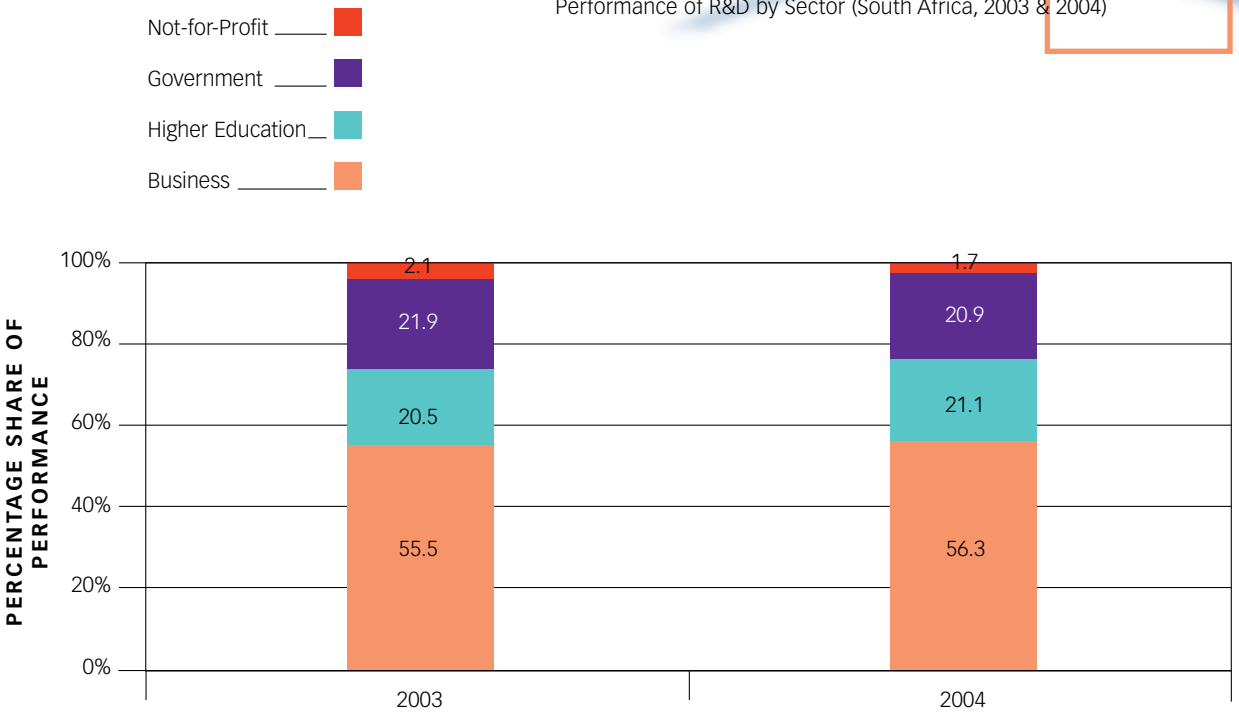


The business sector accounts for 56.3% of R&D performance in South Africa, followed by the higher education sector (21.1%). The government sector (including Science Councils) accounted for 20.9% of total R&D expenditure and the not-for-profit sector contributed 1.7%. The increase in the percentage of R&D performed by the business and higher education sectors since 2003 mostly arises from a combination of better coverage and increased R&D activities within these sectors.

SOURCE: South African National Research and Experimental Development Survey 2003/04 and 2004/05

Fig 7:

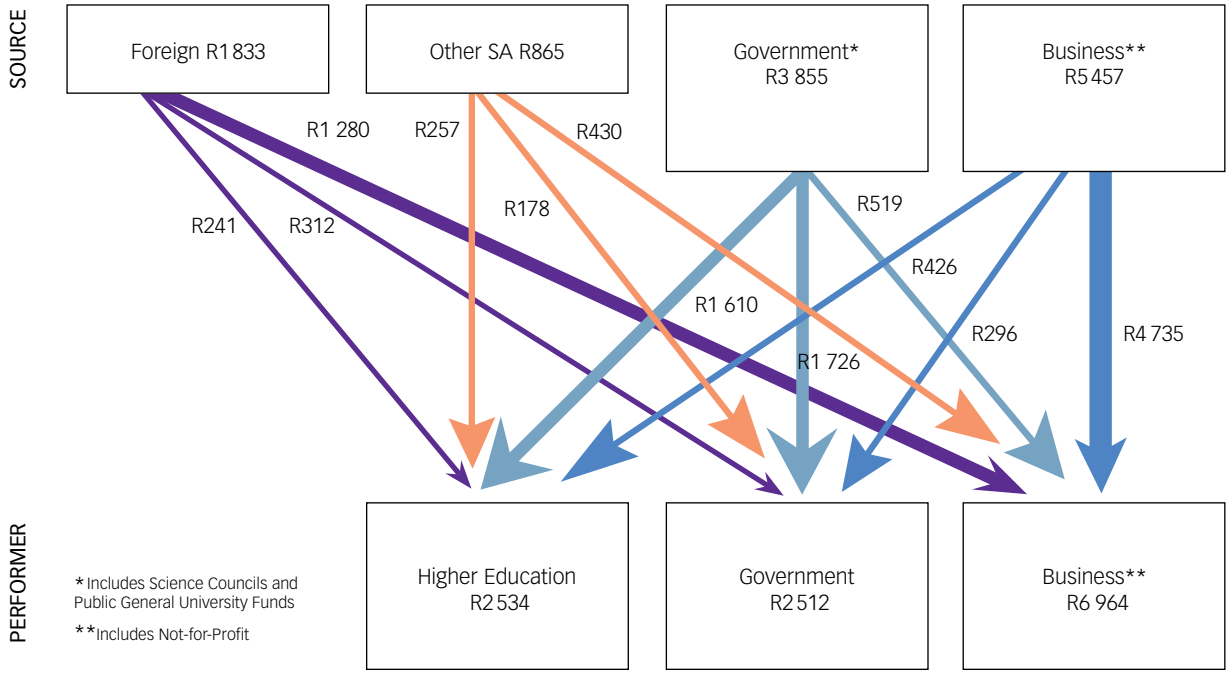
Performance of R&D by Sector (South Africa, 2003 & 2004)



The business sector is the largest performer of R&D in South Africa and funds 68% of this R&D from its own domestic sources and also receives a further 18.4% of funding from foreign business sources. As the second largest funder in South Africa, the government sector funds approximately R3.9 billion (32.1%) of R&D activity in South Africa. About 15% of total funds are provided by foreign sources (up from the 10% in 2003/04). The increase in reported government funding arises from both new money and from improved reporting of higher education sources of funding.

Fig 8:

Major flows of funding for R&D, 2004/05 (R millions)



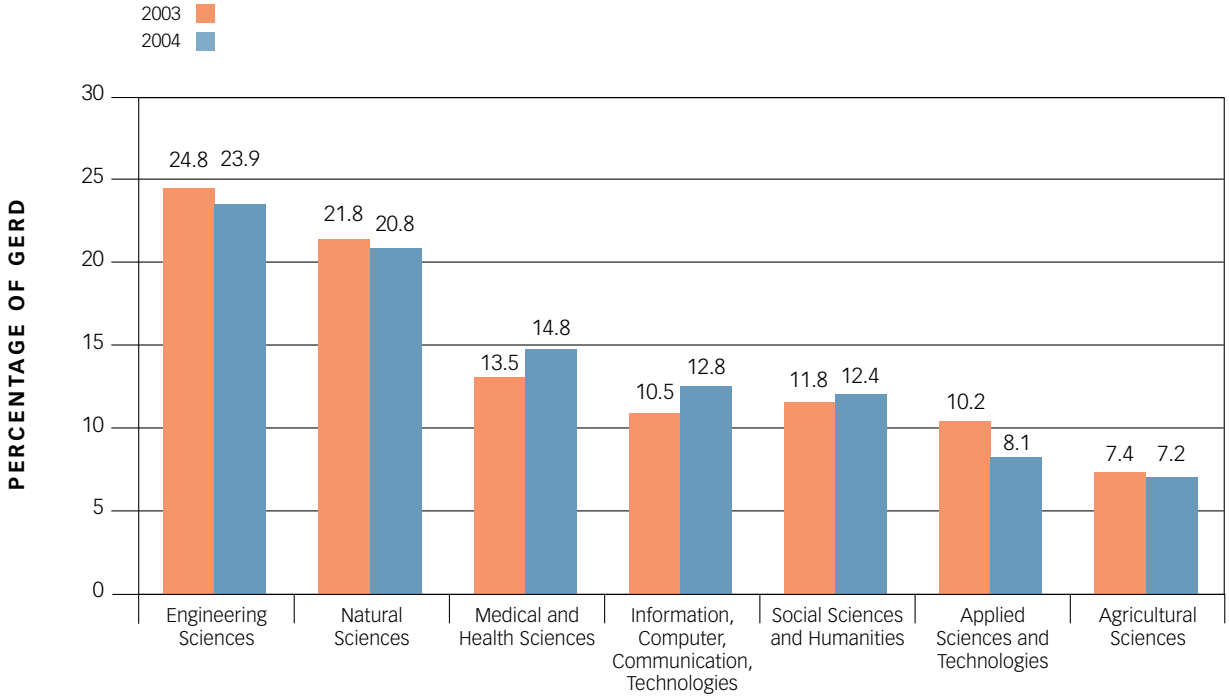
In 2004 the largest proportion of R&D in South Africa took place in fields related to the engineering sciences (23.9%) followed by the natural sciences (20.8%) and the medical and health sciences (14.8%). The social sciences and humanities accounted for a further 12.4% of R&D expenditure in South Africa.

Between 2003 and 2004, expenditure on R&D in the fields of information, computer and communication technologies increased from 10.5% to 12.8% of total expenditure, while the applied sciences and technologies experienced a relative decline in R&D expenditure.

SOURCE: South African National Research and Experimental Development Surveys 2003/04 and 2004/05

Fig 9:

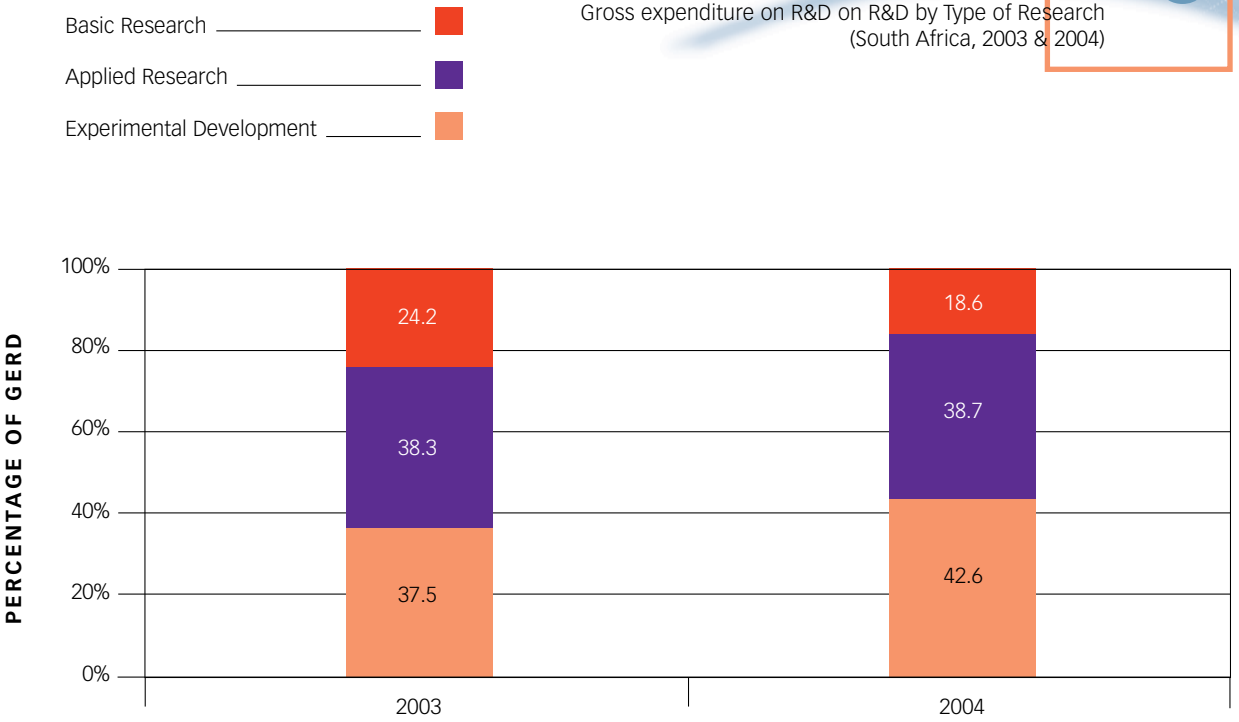
Expenditure on R&D by major research field
(South Africa, 2003 & 2004)



In the 2003/04 R&D Survey, pure basic research and strategic basic research together accounted for 24.2% of total R&D expenditure. In the interest of simplicity, for the 2004/05 R&D Survey the category of strategic basic research was dropped from the questionnaire and this move could partly be responsible for the fall in reported basic research to 18.6%. R&D expenditure devoted to applied research comprised the largest proportion of R&D in South Africa in 2003/04 but in 2004/05 expenditure on Experimental Development, mainly by the business sector, accounted for the bulk (42.6%) of R&D expenditure. The increase in experimental development arises from improved coverage of clinical trials and the services sector.

Fig 10:

Gross expenditure on R&D on R&D by Type of Research
(South Africa, 2003 & 2004)

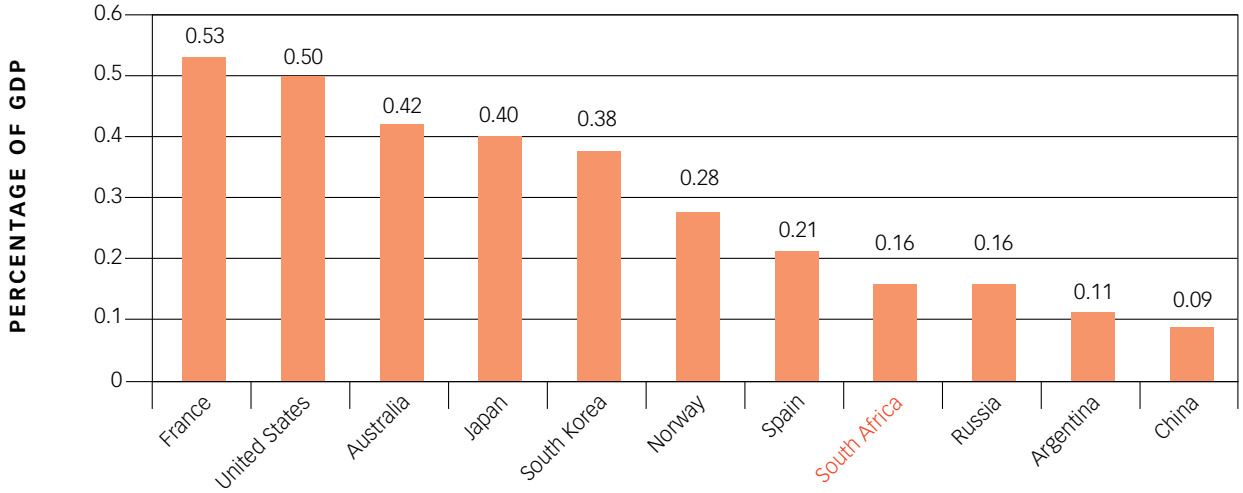


Basic research expenditure (as a percentage of GDP) is an indicator that signals the R&D capacity that is responsive to new challenges. South Africa's expenditure on basic research of 0.16% of GDP is slightly down from the 0.19% recorded in 2003. Most countries reflected in the graph have had a relatively stable percentage of GDP devoted to basic research over the past decade, with France topping the list with 0.53% of GDP devoted to basic research.

Fig 11:

Basic research as a percentage of GDP 2004* (International Comparisons)

* or latest year available



CONTACT DETAILS

science & technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Department of Science and Technology
Private Bag X894
Pretoria 0001
Republic of South Africa
www.dst.gov.za
Tel: 012 843 6300

Dr P Mjwara
Director General

Dr A Paterson
Group Executive: Science & Technology Expert Services

Mr C Mokonoto
Manager: S&T Indicators, NACI

Prof M Kahn
Executive Director
Centre for Science, Technology and Innovation Indicators (CeSTII)
Knowledge Systems Group
Human Sciences Research Council (HSRC)
Tel: 021 466 7802/04

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