

DEPARTMENT OF SCIENCE AND TECHNOLOGY

National Survey of Research and Experimental Development (R&D)
(2003/04 Fiscal Year)

HIGH-LEVEL KEY RESULTS



Department of Science and Technology

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*or latest year available

PREFACE

The 2003/04 National Survey of Research and Experimental Development (R&D) is the first such survey to be conducted under the aegis of a single focused Ministry of Science and Technology in South Africa. It is therefore with great pleasure that we now release the High-Level Key Results of the 2003/04 R&D Survey.

R&D Surveys provide data, collected under strict conditions of confidentiality, that are essential for planning at system and organisational level, and which furnish key indicators of national competitiveness.

The 2003/04 Survey took slightly less than a year to conduct, yet was able to draw in a much wider range of respondents than that of 2001/02. The 2001/02 Survey remains the baseline year on which to build a reliable timeline. The increased response is because 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 was double that of the 2001/02 survey in terms of responding firms.

Accordingly, we are confident that our measurement and understanding of the extent of R&D activity in our country has significantly improved.

The 2001/02 R&D Survey showed that South Africa spent R75 billion on R&D that amounted to 0,76% of GDP. In 2002, it would have required an additional R2 billion to attain a level of 1% of GDP expenditure on R&D. Attaining the targeted 1% goal by 2008 remains the strong intention of Government in partnership with the firms that prioritise this crucial type of spending.

Happily South Africa's GDP has grown considerably since 2002, and now stands at R1 251 billion. The increase reflects both real growth, and a recalculation of the components of GDP by Statistics South Africa.

The 2003/04 R&D Survey reveals that our national R&D expenditure of R10.1 billion amounts to 0.81% of GDP. This is a very encouraging figure. So we are on course to meet the target of 1% of GDP.

The full results of the 2003/04 R&D Survey will be disseminated in mid-2005 at www.hsrc.ac.za/RnDSurvey. The results of the 2001/02 R&D Survey are already available.

We now conduct the R&D Survey annually. The next survey will cover the period 2004/05. In addition, the Department has commissioned the first large-scale Innovation Survey that will yield results toward the middle of 2006. 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 project team headed by Professor Michael Kahn. 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.

I intend requesting the National Advisory Council on Innovation (NACI) to provide me with a further detailed analysis of the current 2003/4 Survey data.



Mr M Mangena
Minister of Science and Technology
Cape Town, 14 April 2005

A NOTE ON METHODOLOGY

This publication comprises the high-level results of the 2003/04 Research and Experimental Development Survey. Both this survey and the 2001/02 survey follow 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 2003/04 survey comprised a census across Higher Education institutions and Science Councils, and purposive surveys across government departments, not-for-profit organisations and the business sector. In the case of the purposive surveys the response rate shows significant improvement on that of 2001/02. It is anticipated that there will be yet further improvement in response rate in the next (2005) survey.

TABLE 1: KEY FIGURES

INDICATOR	VALUE	
	2001/02	2003/04
Gross domestic expenditure on R&D – GERD (millions Rands)	7 488.1	10 082.6
GERD as a percentage of GDP ^a	0.76	0.81
Total R&D personnel (FTE) ^{b,c}	21 195	25 185
Total researchers (FTE) ^{b,c}	14 182	14 129
Total researchers per 1000 total employed (FTE) ^{b,c,d}	3.1	2.2
Total R&D personnel per 1000 total employed (FTE) ^{b,c,d}	4.6	3.9
Estimated civil GERD as a percentage of GDP	0.71	0.72
Total researchers (headcount) ^c	26 913	30 703
Women researchers as a percentage of total researchers ^c	36.0%	38.0%
<p>^aThe 0.76% for 2001/02 is as reported in the 2001/02 R&D Survey Report and is not based on revised GDP figures.</p> <p>^bFTE = Full Time Equivalent</p> <p>^cFollowing OECD practice, doctoral students are included as researchers.</p> <p>^dChanges in the methodology used by Statistics South Africa in the Survey of Employment and Earnings have resulted in a 39% increase in the total number of employees reported for the formal non-agricultural sectors between March 2002 and March 2004.</p>		

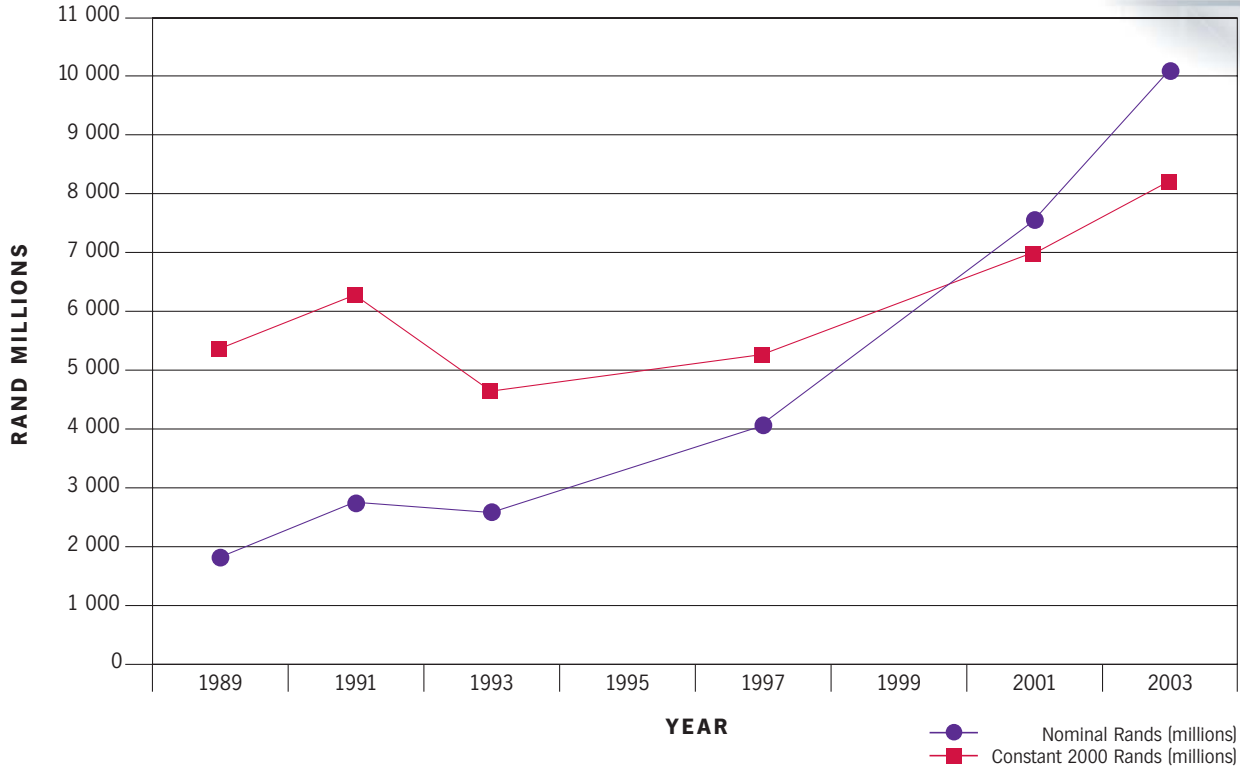
Since 2001, R&D expenditure has grown both in nominal and real terms. In 2003/04 total R&D expenditure in South Africa reached a level of just over 10 billion Rand, representing an increase of 2.5 billion Rand since 2001. This increase is partly due to a general increase in survey coverage in all sectors.

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, 1989-2003)

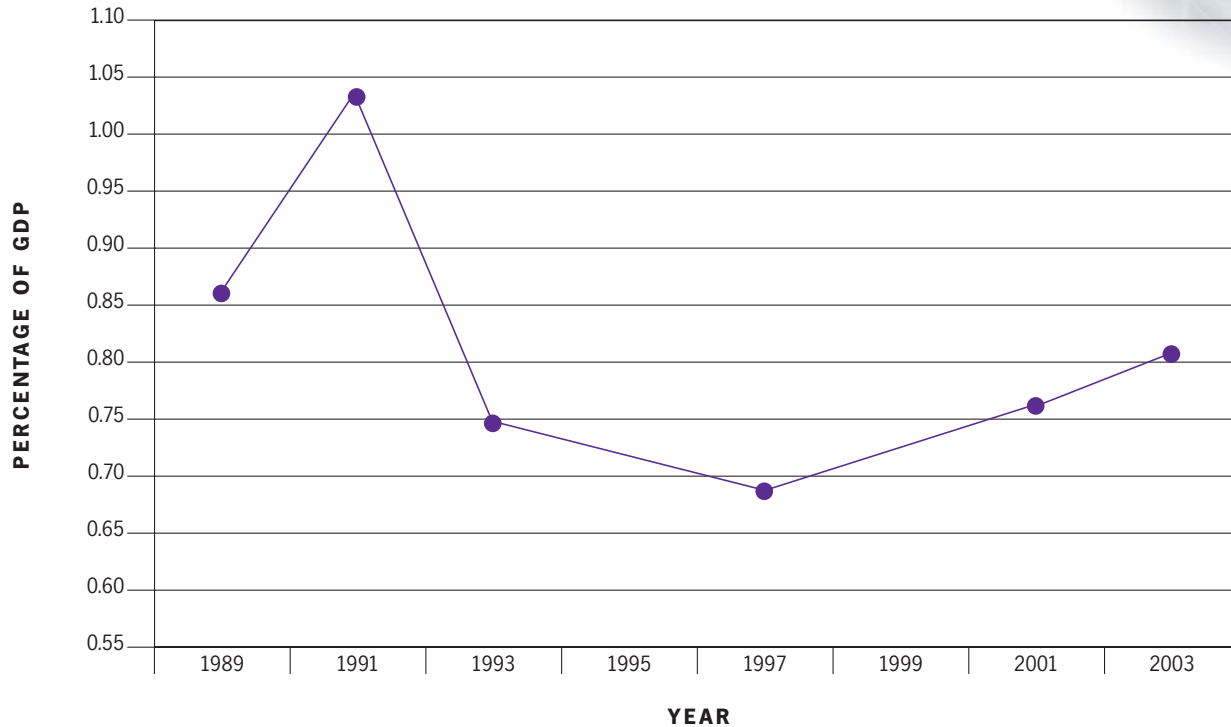


The increase in gross expenditure on R&D (GERD) in real terms since 2001 has resulted in an increase in GERD expressed as a percentage of GDP. The data suggest a steady increase in GERD as a percentage of GDP from 0.69% in 1997 to 0.81% in 2003. Although the research system appears to have grown considerably since 1997, the challenge to reach the goal of 1% of GDP remains.

SOURCE: South African National R&D Surveys

Fig 2:

Gross expenditure on R&D as a percentage of GDP (unrevised)
(South Africa, 1989-2003)



Although South African GERD as a percentage of GDP has increased between 2001 and 2003, it has not kept pace with countries such as China and Russia, that have shown regular increases in GERD expressed as a percentage of GDP since 1995. China remains the country with the fastest growing research intensity, reflecting an increase from 1.07% of GDP in 2001 to 1.22% of GDP in 2002.

SOURCE: International comparisons – OECD Main Science and Technology Indicators, (2004 Edition)

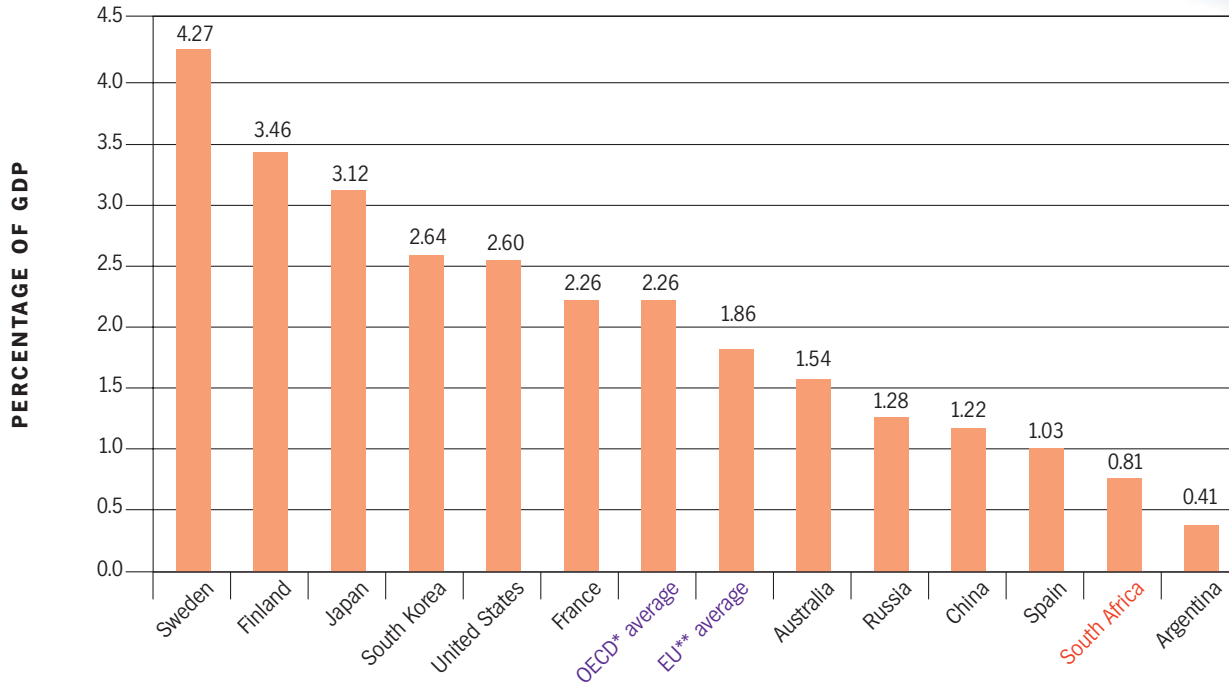
Fig 3:

Gross expenditure on R&D as a percentage of GDP 2003* (International Comparisons)

* or latest year available

* Organisation for Economic Cooperation and Development

** Expanded European Union (25 states)



At a level of 2.2 FTE researchers per 1000 total employed, South Africa has a relatively low number of researchers when compared with other countries.

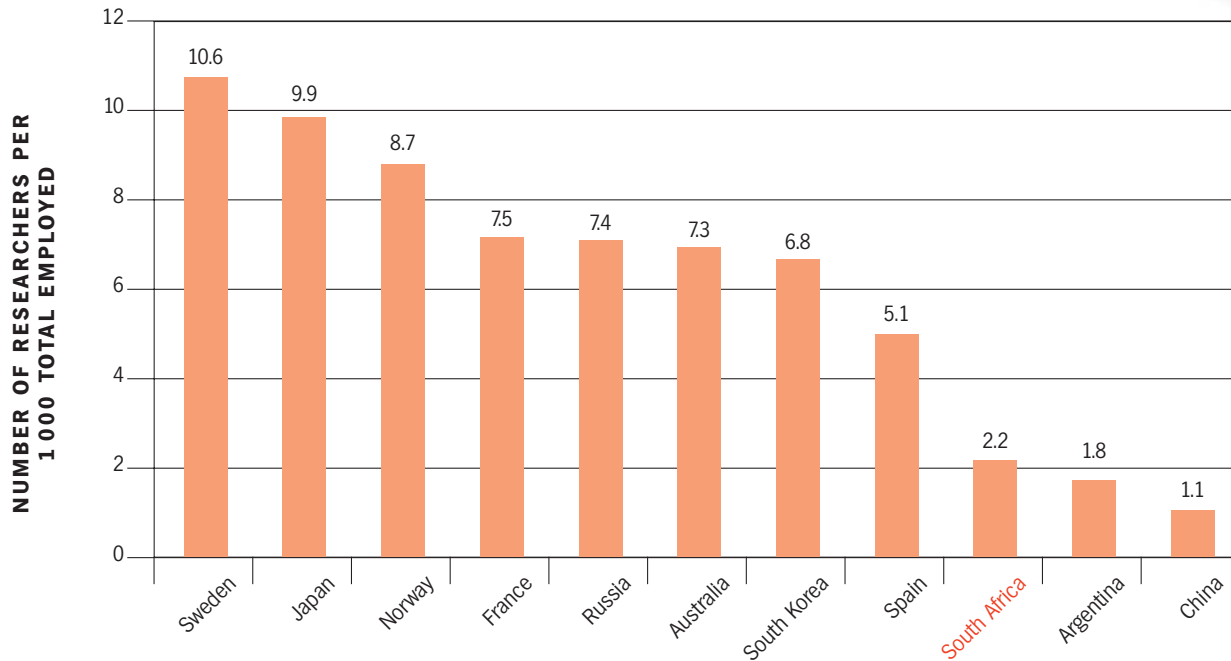
The 2003/04 survey reflected a total of 14 129 researcher FTEs in South Africa, of which approximately 28% comprised doctoral students and post-doctoral fellows.

SOURCE: International comparisons – OECD Main Science and Technology Indicators, (2004 Edition)

Fig 4:

Number of Full Time Equivalent (FTE) researchers per 1000 total employed in 2003* (International Comparisons)

* or latest year available



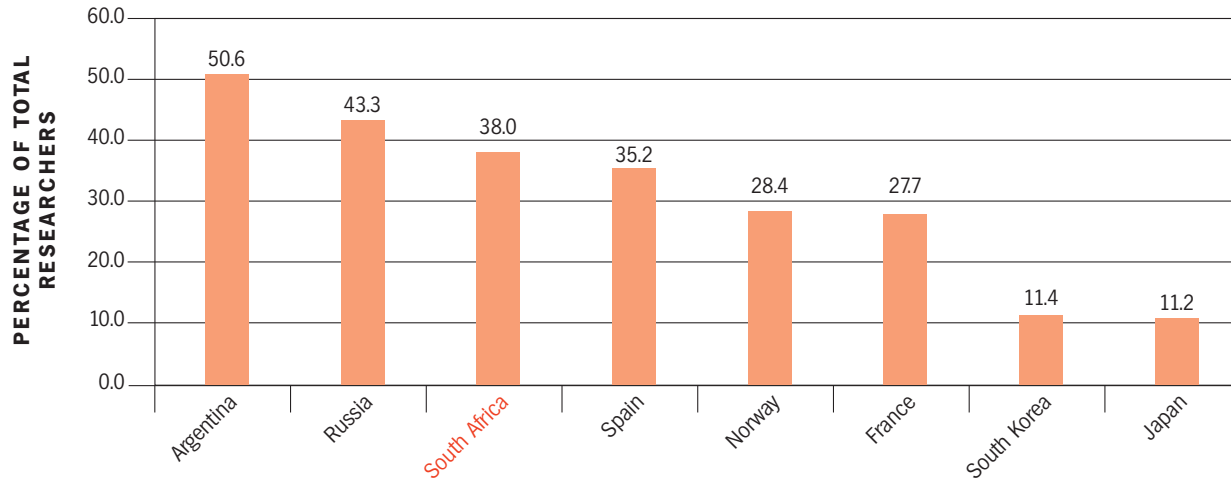
South Africa remains one of the few countries that provides data on women in their R&D statistics. Between 2001 and 2003 women researchers as a percentage of total researchers in South Africa increased by 2.0%, indicating that the country is making progress in terms of gender representivity within the field of research and experimental development. Of those countries that do report 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 (2004 Edition)

Fig 5:

Women researchers as a percentage of total researchers (headcount) 2003* (International Comparisons)

* or latest year available

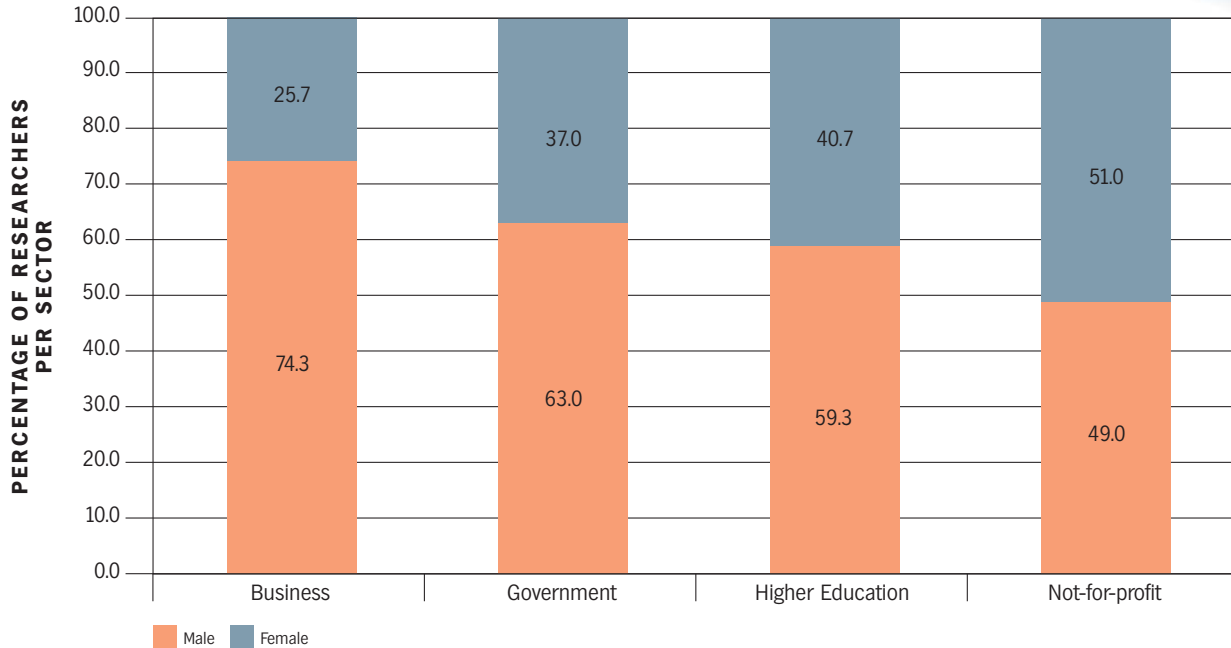


When comparing the percentage of women researchers across the various sectors in South Africa, disparities become evident. The not-for-profit sector displays the largest percentage of women researchers, followed by the higher education sector, government (including the Science Councils) and the business sector. In keeping with the national trend, all sectors displayed an increase in the percentage of women researchers between 2001 and 2003, with the business sector reflecting the largest increase in women researchers.

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

Fig 6:

Women researchers as a percentage of total researchers (headcount) per sector (South Africa, 2003)

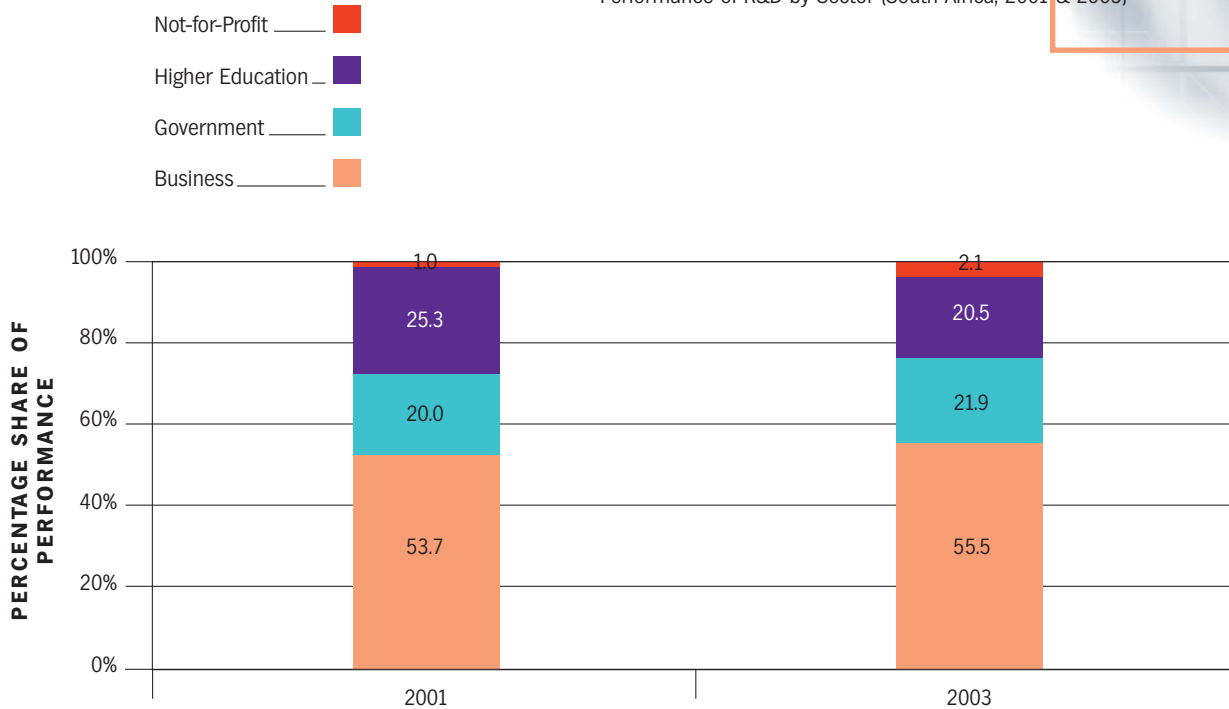


The business sector accounts for 55.5% of R&D expenditure in South Africa, followed by the government sector (including Science Councils) (21.9%) the higher education sector (20.5%) and the not-for-profit sector (2.1%). The increase in the percentage of R&D performed by the business, government and not-for-profit sectors since 2001 is mostly accounted for by the greater coverage attained within these sectors by the 2003/04 survey.

SOURCE: South African National Research and Experimental Development Survey 2001/02 and 2003/04

Fig 7:

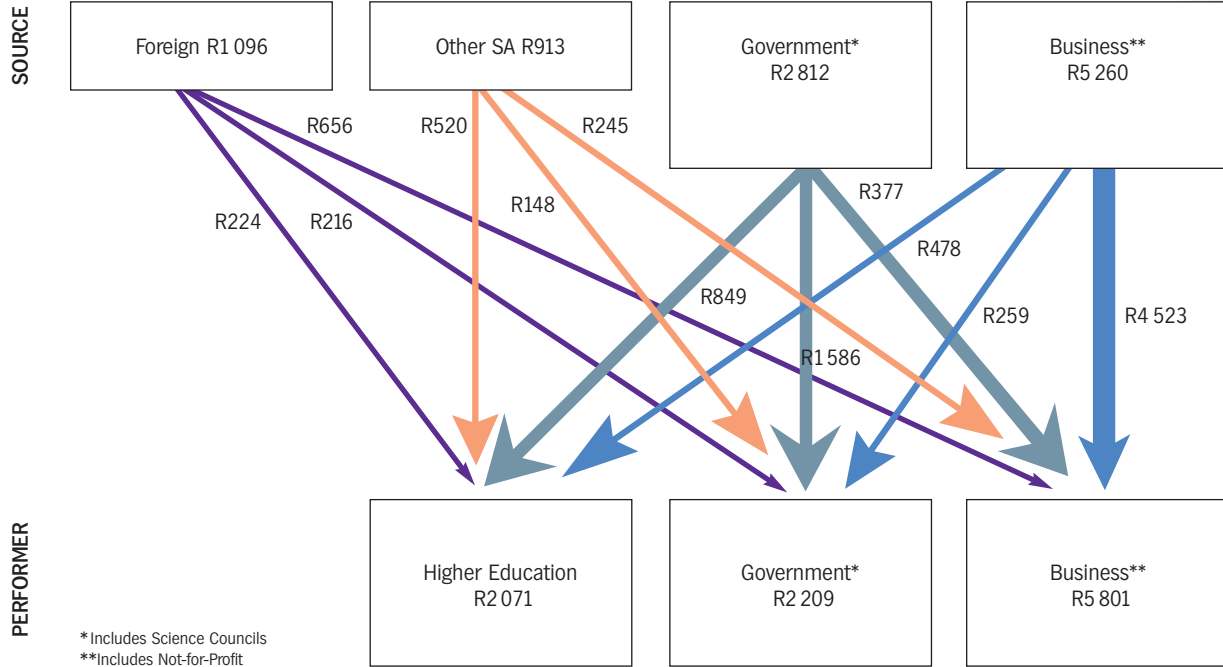
Performance of R&D by Sector (South Africa, 2001 & 2003)



As the largest performer of R&D in South Africa the business sector can largely be described as an R&D island, receiving relatively little funding from both national and international sources. As the second largest funder in South Africa, the government sector funds approximately R2.8 billion (27.9%) of R&D activity in South Africa. Interestingly, ten percent of total funds are provided by foreign sources. Sources of funds are reported as disclosed by survey respondents. Funds attributed to "Other SA" sources are from cases where respondents did not fully account for the sources of funds used in the performance of their R&D. Higher education institutions accounted for the bulk of these instances.

Fig 8:

Major flows of funding for R&D, 2003/04 (R millions)



*Includes Science Councils

**Includes Not-for-Profit

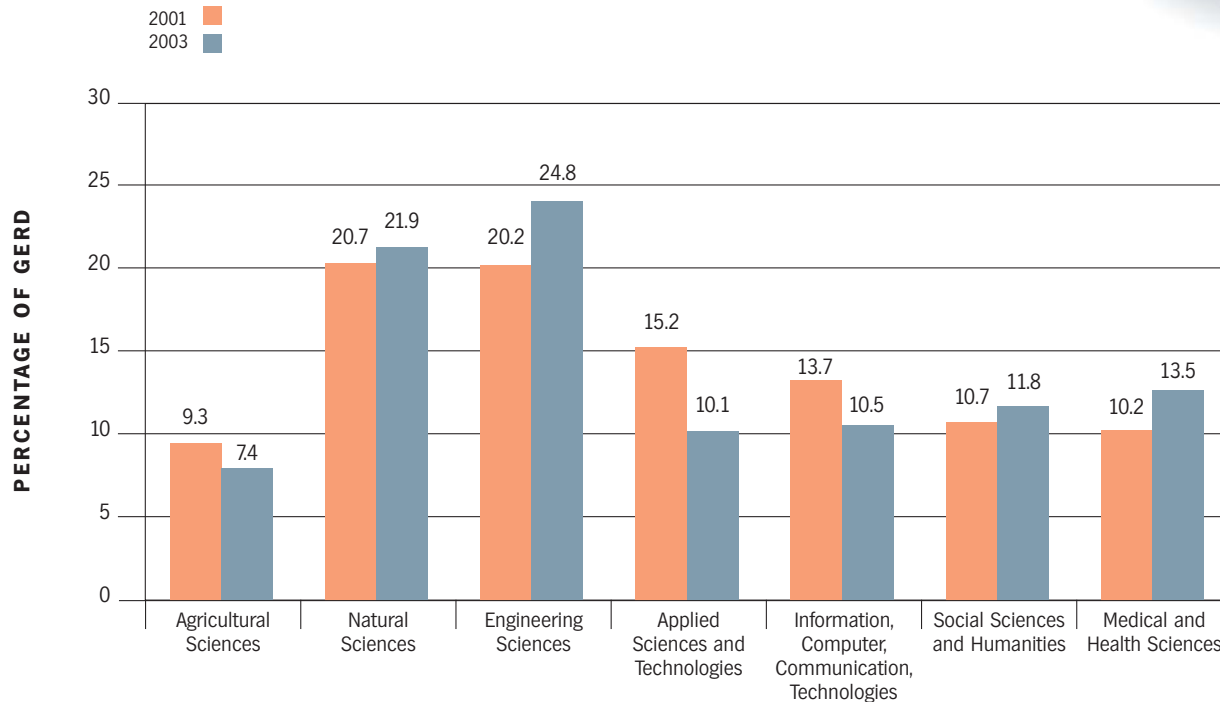
In 2003 the largest proportion of R&D in South Africa took place in fields related to the engineering sciences (24.8%) followed by the natural sciences (21.9%) and the medical and health sciences (13.5%). The social sciences and humanities accounted for a further 11.8% of R&D expenditure in South Africa.

Between 2001 and 2003, expenditure on R&D in the engineering sciences increased by 4.6% while the applied sciences and technologies experienced a 5.0% decline in R&D expenditure. The information and communication technologies and agriculture experienced an increase in R&D expenditure in real terms although their share of total R&D expenditure declined for the period.

SOURCE: South African National Research and Experimental Development Surveys

Fig 9:

Expenditure on R&D by major research field
(South Africa, 2001 & 2003)

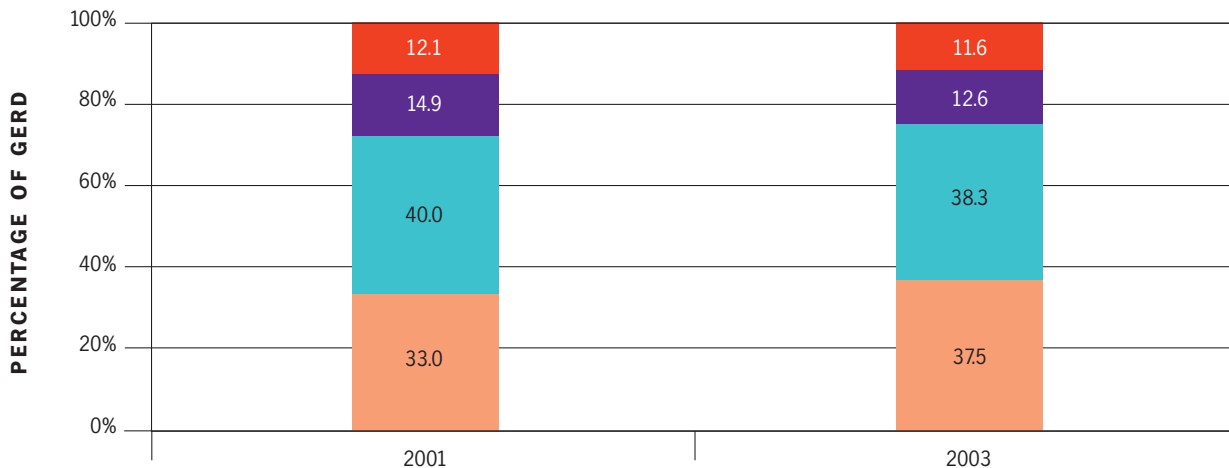


In 2003, pure basic research and strategic basic research together accounted for 24.2% of R&D, reflecting a proportional decrease of 2.8% since 2001. Although R&D expenditure devoted to applied research still accounts for the largest proportion of R&D in South Africa, there appears to have been some decrease in the proportion of R&D devoted to applied research between 2001 and 2003. Expenditure on Experimental Development has increased slightly since 2001, and is largely accounted for by activities within the business sector.

Fig 10:

Gross expenditure on R&D by Frascati classification of intention
(South Africa, 2001 & 2003)

- Pure Basic Research ■
- Strategic Basic Research ■
- Applied Research ■
- Experimental Development ■



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 of 0.19% remains relatively unchanged from that of 2001. Most countries reflected in the graph have experienced a slight increase in the percentage of GDP devoted to basic research, with France topping the list with 0.53% of GDP devoted to basic research.

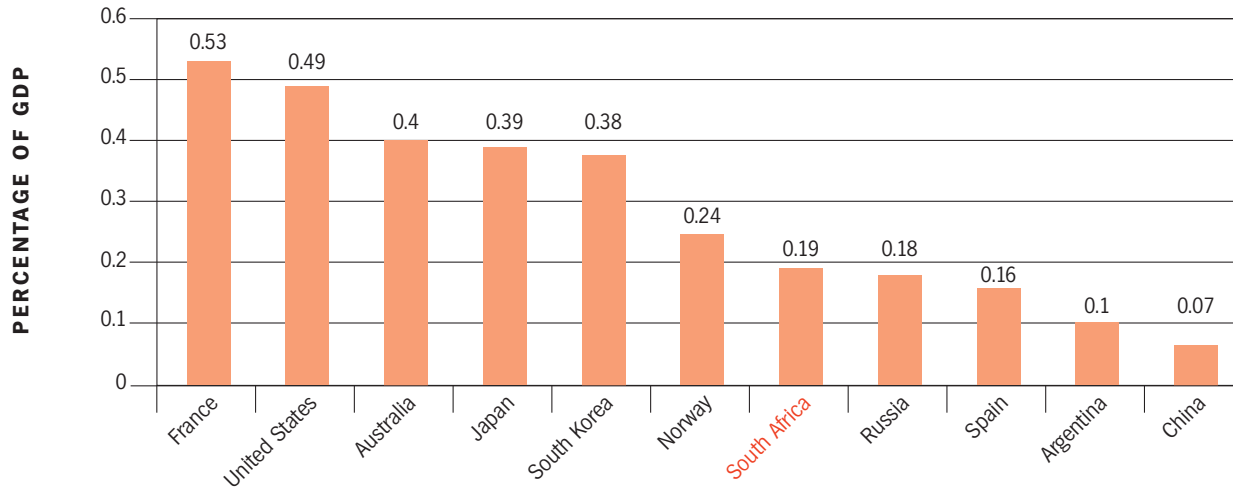
****Pure Basic Research:** Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without a specific application in view.

Strategic Basic Research: Basic Research directed into specific broad areas in expectation of useful discoveries.

Fig 11:

Basic research as a percentage of GDP 2003* (International Comparisons)

*or latest year available



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