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SOUTH AFRICAN NATIONAL SURVEY OF RESEARCH AND EXPERIMENTAL DEVELOPMENT

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STATISTICAL REPORT
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FOREWORD

The National Survey of Research and Experimental Development (R&D Survey) is the primary source of aggregate statistics on expenditure and the human capital devoted to R&D in a given period. The survey contributes to a body of official statistics and helps to report the country's progress in R&D as a critical element for development and economic transformation, both in South Africa and in the global context.

The Department of Science and Technology (DST) oversees the production of this survey as a partner within the South African National Statistics System (SANSS). This arrangement is consistent with the Statistics Act (No. 6 of 1999) and enables the Statistician General (SG) to coordinate statistical production in the country, even beyond the confines of Statistics South Africa (Stats SA). Accordingly, the survey is subject to an ongoing process of quality assessment in terms of the South Africa Statistical Quality Assessment Framework (SASQAF) to ensure that the survey remains credible and true to its purpose. The quality assessments undertaken in every instance prior to publication of the R&D survey since 2010 have reported consistent improvements in key indicators of statistical quality.

The survey quality Clearance Committee noted that the 2014/15 R&D Survey was conducted following good practices and met most of the set quality requirements even though the timeliness dimension is of serious concern. The ongoing efforts for expanding the universe targeted for the business sector and the not-for-profit sectors altered some quality indicators: additional units covered in these sectors led to higher out-of-scope rate overall, and as a result, the questionnaire response rate declined from 85.4% in 2013/14 to 67.9% in 2014/15; collection rate, a new indicator introduced in the 2012/13 survey, was 75.9%. Indications are that R&D in South Africa is concentrated in few large R&D performing units across institutional sectors, thus requiring the survey to purposely cover such units. Monitoring of the aforementioned quality indicators must continue as the survey stabilises its population of likely R&D performing units. Greater effort is required to substantially improve the timeliness indicators.

New uses of R&D statistics in the country and the recent publication of the new version of international guidelines used for this survey (i.e. *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development*) puts new requirements to the conduct of this survey in South Africa. Statistics South Africa and the DST have begun a process to scope the likely enhancements to the survey going forward.

Given my assessment of the recommendation of the Clearance Committee for this survey, I endorse the 2014/15 R&D Survey results and encourage its use by stakeholders.

Dr Pali J Lehohla
Statistician General, Republic of South Africa

PREFACE

In the two decades of implementing the 1996 White Paper on Science and Technology, the system for research and development (R&D) in South Africa has advanced. South Africa's R&D sector has now expanded and become more sophisticated and further integrated in the global system than it was then.

As we update the policy approach for the period ahead, the National Survey of Research and Experimental Development (R&D Survey) serves as an important source of evidence informing policy review and planning. The survey is not only an instrument for government to track policy targets, but also for use by a wide range of stakeholders as reference for statistics on the country's performance on key indicators: the size, growth and composition of R&D expenditure, and the human capital devoted to R&D.

The 2014/15 R&D survey shows an improving positive outlook for R&D investment in South Africa. Gross expenditure on research and development (GERD) increased by 8.1% in real terms from 2013/14 to 2014/15. This is the fourth consecutive year that GERD has increased in real terms, after the contraction in 2009/10 and 2010/11. At R23.3 billion in 2014/15, GERD in constant 2010 rand terms has almost reached the peak of R24.1 billion that was achieved in 2008/09. It is encouraging that the business sector, and particularly the manufacturing industry, has shown an acceleration in R&D expenditure, contributing the most to the reported increase in GERD.

GERD as a percentage of Gross Domestic Product (GDP), an indicator of R&D intensity in the economy, was 0.77% in 2014/15, an improvement from 0.73% that was reported in the three consecutive previous surveys. However, this improvement takes place in conditions of a slowing rate of GDP growth, which was 2.2% in 2013 and 1.5% in 2014. Ideally, such an improvement should occur in an environment of strong GDP growth.

With respect to indicators for R&D personnel, the ratio of full-time equivalent researchers per 1 000 employed has stagnated between 1,4 and 1,6 for the past 10 years. This indicates that greater effort is required to expand the researcher workforce, which has grown at an equivalent rate to that of overall employment in the economy.

The policy focus on increasing R&D expenditure – to 1,5% of GDP – remains, and continues to be monitored as part of the government's Medium Term Strategic Framework (2014-2019).

I extend my appreciation, on behalf of the Department of Science and Technology, to the Centre for Science, Technology and Innovation Indicators (CeSTII) of the Human Sciences Research Council (HSRC) for their efforts in conducting this survey each year, and to Statistics South Africa for facilitating the process to assess the quality of the R&D statistics.

A special word of thanks goes to all the survey respondents, in both the private and the public sectors, who gave their time so readily to make this survey a success.

GNM Pandor, MP
Minister of Science and Technology

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The South African National Survey of Research and Experimental Development is conducted annually by CeSTII on behalf of the DST.

The authors of this report extend their appreciation to Dr Phil Mjwara (Director-General of the DST), Professor Crain Soudien (CEO of the HSRC), Dr Leickness Simbayi, (Deputy CEO: Research of the HSRC), Dr Glenda Kruss (Deputy Executive Director, CeSTII) and Mr Pali Lehohla (Statistician-General), for their support of the survey.

The support and contributions of Mr Imraan Patel, Mr Godfrey Mashamba, Ms Tshidi Mamogobo, Ms Rose Msiza and Ms Kgomotso Matlapeng of the DST are greatly appreciated. Technical inputs and advice by the DST and Stats SA teams, as well as from the Clearance Committee for Science, Technology and Innovation Statistical Reports are appreciated.

Interactions with the Organisation for Economic Co-operation and Development's (OECD) Working Party of National Experts on Science and Technology Indicators (NESTI) continue to be invaluable in maintaining the quality and standard of the South African R&D surveys and analysis of the results. We are also most grateful for and acknowledge the co-operation of the respondents to the questionnaire.

The CeSTII team involved with the R&D survey included the following persons in no particular order: Neo Molotja, Mario Clayford, Jerry Mathekga, Theodore Sass, Helen Morrisey, Sinovuyo Takatshana, Lwando Kondlo, Loyiso Maciko, Kesewaa Koranteng, Precious Mudavanhu, Farzanah Frieslaar, Maria Maluleke, Gina Mshengu, Nazeem Mustapha, Saahier Parker, Natasha Saunders, Moses Sithole, Natalie Vlotman, Hlamulo Makelane, Gerard Ralphs, and Lindiwe Binda.

ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BERD	Business Expenditure on R&D
CeSTII	Centre for Science, Technology and Innovation Indicators
DST	Department of Science and Technology
FTE	Full-time Equivalent
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government intramural Expenditure on R&D
HEMIS	Higher Education Management Information System
HERD	Higher Education Expenditure on Research and Development
HIV	Human Immunodeficiency Virus/
HSRC	Human Sciences Research Council
ICT	Information and Communication Technologies
NESTI	National Experts on Science and Technology Indicators
NPO	Not-for-Profit Organisation
NSI	National System of Innovation
NSO	National Statistical Organisation
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Experimental Development
RDSMS	Research and Development Survey Management System
SA	South Africa
SASQAF	South African Statistical Quality Assessment Framework
SEO	Socio-economic Objective
SIC	Standard Industrial Classification
SNA	System of National Accounts
SPII	Support Programme for Industrial Innovation
Stats SA	Statistics South Africa
SVC	Statistical Value Chain
TB	Tuberculosis
VAT	Value Added Tax

DEFINITIONS AND DESCRIPTIONS

Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Biotechnology is an 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.

Capital expenditures are the annual gross expenditures on fixed assets used in the R&D programmes of statistical units. These are reported in full for the period when they took place and are not registered as an element of depreciation. Capital expenditures on R&D consist of buildings, vehicles, plant machinery and equipment.

Civil gross expenditure on research and development (Civil GERD) is the sum of all expenditure by socio-economic objective (SEO), minus expenditure on defence R&D.

Constant 2010 Rands is the value of goods and services of a given year using the prices of a determined base reference year, which is 2010 in this case. These values were obtained by deflating with the GDP deflator using data published in the Statistics South Africa GDP survey P0441 4th Quarter 2015 (Stats SA, 2016).

Current expenditure is expenditure on items that generally reoccur after a short period. Current expenditure on R&D activities consists of labour costs and other current expenditures.

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.

Full-time equivalent (FTE) is an estimate of the time spent on R&D activities. It is the proportion of time spent on R&D activities out of all time spent at work.

FTE per 1 000 in total employment: Number of professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of these projects during a given year expressed as a proportion of 1,000 employed people. It is calculated by number of researchers during a given year divided by the total employed people and multiplied by 1 000.

Gross domestic product (GDP) is the total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports. This statistic is obtained from the Statistics South Africa GDP survey P0441, 4th Quarter 2015 (Stats SA, 2016).

Gross expenditure on research and development (GERD) covers all expenditures for R&D performed on national territory in a given year. It thus includes domestically performed R&D which is financed from abroad but excludes R&D funds paid abroad, notably to international agencies.

Headcounts refers to the number of people directly involved in or supporting R&D (i.e. the total number of R&D personnel within a category).

In-house or intramural R&D refers to R&D performed by the unit or entity itself (i.e. by the personnel of the unit or entity). This is R&D performed within the borders of South Africa, even if funded by foreign sources.

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, payroll taxes, etc. The labour costs of persons providing indirect services which 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 and included in other current costs.

New materials pertain to the technology and R&D activities of high-tech companies particularly in the aerospace, construction, electronic, biomedical, renewable energy, environmental remediation, food and packaging, manufacturing and motor car industries. New materials include multi-functional materials, advanced materials, nano-materials, nano-composites and nano-technology.

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometres, where unique phenomena enable novel applications.

Open-source software is computer software that is available in source code form under an open-source licence. The source code and certain other rights normally reserved for copyright holders are provided under a software licence that permits anyone to study, change, improve and at times also to distribute the software.

Other current expenditure comprise non-capital purchases of materials, supplies and equipment to support R&D performed by the statistical unit in a given year. These include, but are not limited to running costs, overhead expenses, repairs and maintenance, payments to outside organisations for use of specialised testing facilities, payments to outside organisations for specialised services and on-site consultant expenses in support of R&D projects carried out by the R&D performer.

Outsourced R&D refers to R&D done by another entity on behalf of the reporting unit and paid for by the reporting unit.

R&D intensity estimated by GERD as a proportion of GDP is the total intramural expenditures on R&D performed in the country in a given year relative to GDP.

R&D personnel refers to all persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical staff.

Researchers are R&D personnel engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.

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

Socio-economic objective (SEO) classification provides an indication of the R&D activities by main purpose. The SEO classification used in this survey is consistent with the Nomenclature for the Analysis and Comparison of Scientific programs and Budgets (NABS) that was published by Eurostat in 2007.

Statistical unit is an entity for which statistical data are collected or derived.

Standard Industrial Classification (SIC) codes are used by Statistics South Africa for describing the economic activities of industries.

State Owned Enterprises (SOEs) are public corporations owned by government units mainly engaged in market production and sale of the kind of goods and services often produced by private enterprises.

Total employment is the total employed labour force in the South African economy. This statistic is obtained from Stats SA Labour Force Survey series P0211 (Stats SA, 2015) where employed persons were defined as those aged 15–64 years who, during the reference week, did any work for at least one hour, or had a job or business but were not at work (temporarily absent).

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A. INTRODUCTION

This Statistical Report presents data tables from the 2014/15 South African National Survey of Research and Experimental Development (R&D survey). The report provides key findings of the survey with commentary, standard summary tables of the overall findings from 2014/15 along with time series from previous surveys. The Statistical report is published together with the Main Analysis report, which provides analysis of the survey data.

The survey covers the sectors that perform R&D in South Africa.

- The business enterprise sector, comprising large, medium and small enterprises, including state owned enterprises.
- The government sector, comprising national, provincial and municipalities, government research institutions and museums.
- The higher education sector, comprising all public higher education institutions and private higher education institutions.
- The not-for-profit sector, comprising non-governmental and other organisations formally registered as not-for-profit institutions.
- The science council sector, comprising the seven science councils established through Acts of Parliament.

This approach is followed to maintain consistency with the institutional sector categorisation recommended 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).

R&D statistics are presented in tables according to the following categories:

- Gross domestic expenditure on research and development (GERD), and R&D expenditure by R&D-performing sectors
- Local and international sources of funding for R&D sectors
- R&D expenditure by field of research and socio-economic objective, and by industrial sector in the business sector
- R&D expenditure in selected areas of policy interest, namely biotechnology, nanotechnology, environment-related, open-source software, new materials, and tuberculosis (TB), HIV/AIDS and malaria research.
- R&D personnel.

GDP values were obtained from the Stats SA GDP statistical release P0441 (Stats SA, 2016), and the total employment level was taken from the Stats SA Quarterly Labour Force Survey statistical release P0211 (Stats SA, 2015).

All financial quantities presented in this report are in current values, unless otherwise indicated. Constant 2010 Rand values were calculated using the GDP deflator.

The headline indicator of GERD/GDP has been recalculated to adjust for ongoing revisions in the Stats SA GDP[1] series.

The classification of main institutional sectors recommended in the System of National Accounts (EC, IMF, OECD, UN and World Bank, 2009) is indicated in terms of those used in the Frascati Manual (OECD, 2002). This is only used indicatively in this report to assist users of data for R&D capitalisation purposes. Full implementation of this procedure will be done once the changes published in the 7th edition of the Frascati Manual have been finalised.

1 The R&D survey has historically used the GDP series calculated according to the production method.

New tables have been included to assess the R&D activities of State Owned Enterprises (SOEs). This will address new user needs for this type of data. These tables will be continued in future R&D series.

Section B is about the main findings of the survey, including commentary on key developments. Section C contains a detailed set of tables describing the survey results for 2014/15 and the preceding nine years. The description of the survey methodology is contained in Section D, and the business sector questionnaire for the 2014/15 survey is reproduced in Section F.

B. KEY FINDINGS FOR 2014/15

Growth in GERD was at a five-year high of 8.1% in real terms

- South Africa's gross expenditure on research and experimental development (GERD) stood at R29.345 billion[2] at current Rand values in 2014/15.
- At constant 2010 prices[3], GERD amounted to R23.257 billion. The year-on-year change of 8.1% from 2013/14 to 2014/15 was the highest growth rate achieved since 2006/07, when growth in GERD was recorded at 9.9%.

GERD as a percentage of GDP rose four basis points to 0.77% in 2014/15

The increase in GERD was greater than the relative increase in the level of GDP, after three consecutive periods of keeping pace with GDP.

Table B.1: Summary of key statistics and indicators (2012/13 to 2014/15)

KEY INDICATOR	2012/13	2013/14	2014/15
Expenditure on R&D			
Gross domestic expenditure on R&D (GERD) (Rm)	23 871	25 661	29 345
Business enterprise expenditure on R&D (BERD) (Rm)	*10 571*	*11 783*	*13 291*
Not-for-profit (NPO) expenditure on R&D (Rm)	*504*	*583*	*779*
Government expenditure on R&D (GOVERD) (Rm)	*1 438*	*1 697*	*1 893*
Science council (SCI) expenditure on R&D (Rm)	*4 026*	*4 305*	*5 005*
Higher education (HE) expenditure on R&D (HERD) (Rm)	*7 333*	*7 293*	*8 378*
Gross domestic expenditure on R&D in constant 2010 prices (Rm)	*21 213*	*21 515*	*23 257*
Funding sources			
Government-funded* R&D (Rm)	10 832	11 007	12 873
Business-funded R&D (Rm)	9 152	10 616	11 982
Foreign funding of R&D (Rm)	*3 117*	*3 315*	*3 566*
Foreign funding of BERD (Rm)	*1 190*	*1 227*	*1 419*
Foreign funding of NPO R&D (Rm)	*262*	*333*	*457*
Foreign funding of GOVERD (Rm)	*144*	*259*	*179*
Foreign funding of SCI R&D (Rm)	*511*	*455*	*431*
Foreign funding of HERD (Rm)	*1 010*	*1 043*	*1 080*
R&D personnel			
Total R&D personnel (FTE**)	35 050.3	37 956.5	38 465.0
Total researchers# (FTE**)	21 382.4	23 346.0	23 571.9
Total researchers# (headcount)	42 828	45 935	48 479
Female researchers# (headcounts)	18 724	20 231	21 471
Indicators computed from R&D survey			
GERD as a percentage of GDP (%)	0.73	0.73	0.77
Civil GERD as a percentage of GDP (%)	0.72	0.69	0.72
Basic research (R millions)	6 031	6 102	7 133
Total R&D personnel (FTE**) per 1 000 in total employment	2.4	2.5	2.5

2 Some of this increase in GERD was due to expanded coverage in 2014/15, the size of which is estimated in Section D.4.

3 The GDP deflator value of 126.1784679 for 2014 was used to calculate constant 2010 prices.

Total researchers# (FTE**) per 1 000 in total employment	1.5	1.6	1.5
Female researcher# headcounts as a percentage of total researcher headcounts (%)	43.7	44.0	44.3
Indicators obtained from external data sources			
Gross domestic product (GDP) level at current prices (Rm)	3 262 542	3 534 326	3 796 462
GDP (%)	2.2	2.2	1.5
SA employment ('000)	14 558	15 055	15 459

*Government-funded R&D includes science council and university own funds.

**FTE: Full-time equivalent.

#Researchers include doctoral students and post-doctoral fellows.

Notable developments reflected in key indicators

Economic environment

- GDP underwent a structural adjustment in 2009, which was followed by a similar adjustment in GERD over 2009/10 and 2010/11 (Table C.1). GDP growth rate has declined steadily from 3.2% in 2011 to 1.5% in 2014. This coincided with slow growth in GERD. This changed in 2014/15 when real growth in GERD of 8.1% (albeit off an arguably low base of R21.515 billion) was larger than the GDP of 1.5%. Furthermore, the decrease in GDP from 2.2% to 1.5% experienced between 2013 and 2014 had the effect of increasing GERD/GDP.

Business sector shows large recent increases in R&D expenditure

- Nominal R&D expenditure increased in all sectors in 2014/15 (Table C.1), with the business sector as the largest contributor to the increase in R&D expenditure. The business sector had accelerated increases in R&D expenditure over the last two years, recording R1.212 billion in 2013/14 and R1.508 billion in 2014/15.
- Table C.1 also shows that the higher education sector increased R&D expenditure by R655 million on average over the last five years, whereas the business sector increased expenditure by R430 million on average over the same period.
- Table C.50 details the trends in R&D performance by industrial sectors within the business sector. The industrial sector that contributed most to the business sector was the financial intermediation, real estate and business services sector, which accounted for the largest proportion of BERD at 40.3%. The manufacturing sector was the second largest contributor to BERD at 33.9%. The third largest contributor was the mining sector, which dropped 4.1 percentage points to 10.1%.

Sources of funds

- Government (inclusive of science councils and higher education[4] own funds) continued to be the largest funder of R&D activities at 43.9%, as it has been since 2006/07 (Table C.19), whereas business funded 40.8% of R&D. Foreign sources funded 12.5% and other South African[5] sources have not shown any major change in their contributions to overall R&D activity.
- Foreign funding to science councils and government decreased in 2014/15. The proportion of R&D in science councils that is funded by foreign funds was 8.6%, whereas it formed 10.6% in 2013/14 (Table C.21).

R&D personnel increased by 5.2%

- R&D personnel increased by 3 562 headcounts. The highest increase in R&D personnel in ten years was recorded in 2012/13 (Table C.30), after which the increases have steadily slowed.
- The increase in R&D personnel is mainly due to an increase in researchers by 2 544 headcounts (see Table C.29 for further details), of which 1 835 were doctoral students and postdoctoral fellows at universities.

4 Higher education own funds are termed General University funds (GUF).

5 Other South African sources includes higher education, and not-for-profit institutions.

- Researcher FTEs increased by 1.0%. The number of FTE researchers per 1 000 in total employment remained at 1.5. Table C.28 shows that this indicator has remained within the range of 1.4 to 1.6 since 2005/06.
- The proportion of female researchers increased by 0.3 of a percentage point to 44.3% (Table C.28).

The trend towards applied research persists

- Basic research, applied research and experimental development were in the ratio 24.3 to 48.8 to 26.9 (Table C.6), with the effect that applied research more than doubled that of either experimental development or basic research.
- The proportions of applied and basic research increased by one and a half percentage points and half a percentage point respectively while basic research decreased by two percentage points. The two-thirds increase in applied research of R2.199 billion arose from R&D activity in the business sector.
- Most of R&D activity was undertaken in the engineering sciences (18.7%) and medical and health sciences (18.6%) research fields. A noteworthy trend evident since 2010/11 is the steady increase in the social sciences (Table C.13). Information, computer and communication technologies increased in 2014/15 after a downward trend which became evident in 2010/11.

R&D in the fields of biotechnology and nanotechnology, open source software, materials, as well as the environment related research is a growing proportion of GERD

- In 2014/15, R&D in biotechnology comprised 5.4% and in nanotechnology 2.8% of GERD. If one ignores the volatility in between 2005/06 and 2014/15, both biotechnology and nanotechnology grew 8.4% on average, faster than the compound average growth rate of GERD overall, which was 8.4% in the same period.
- Open source software R&D grew from 1.3% to 2.8% of overall R&D activity in 2014/15. Environment and related R&D increased by 2.6 percentage points to 6.8% of GERD, and R&D in new materials increased by half a percentage point to 3.6% of GERD. R&D in TB/HIV/AIDS and Malaria decreased by 0.9 percentage points to 10.3% of GERD.

State Owned Enterprises (SOEs)

- In the years following 2010/11, the contribution of SOEs to R&D activity (Table C.56 for the amounts of R&D expenditure) in the business sector has grown from 12.6% in 2011/12 to 15.2% in 2014/15.
- Similar to the private sector enterprises in the business sector, SOEs have also increased expenditure on vehicles, plant, machinery and equipment intended for R&D activities over 2013/14 and 2014/15.
- Within areas of policy interest, SOEs contributed mostly to environment-related research, an amount equal to 2.4% of BERD.
- Out of the 6 261 researchers in the business sector, 912 were employed in public enterprises (Table C.75). The dominant demographic in SOEs were White males at 55.4%, with Coloured females making up 0.9% of research staff.

C. TABLES

Notes:

- Totals in the tables may not add up to the sum of their constituent items due to rounding effects.
- Estimates of R&D expenditure, headcounts and full-time equivalent personnel in the science council sector were higher than expected in previous years (CeSTII, 2016) due to two institutions overestimating headcount and full-time equivalent personnel counts. This has been corrected in this report.
- Data from 2001/02 onwards may be downloaded from
  - http://curation.hsrc.ac.za/Datasets-KDBAAA.phtml

C.1. General survey results

C.1.1. Expenditure on research and experimental development

Table C.1: R&D expenditure by sector (2005/06 to 2014/15)

YEAR	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	14 149 239	844 640	2 102 094	2 732 215	8 243 776	226 514
2006/07	16 520 584	1 021 355	2 744 718	3 298 808	9 243 165	212 538
2007/08	18 624 013	1 154 399	2 886 094	3 621 862	10 738 456	223 202
2008/09	21 041 046	1 139 676	3 137 343	4 191 366	12 332 012	240 649
2009/10	20 954 677	1 067 302	3 458 074	5 101 224	11 139 237	188 840
2010/11	20 253 805	1 011 340	3 596 023	5 424 602	10 059 010	162 830
2011/12	22 209 192	1 235 669	3 729 680	6 609 216	10 464 022	170 605
2012/13	23 871 219	1 437 509	4 025 998	7 333 153	10 570 726	503 833
2013/14	25 660 573	1 697 151	4 304 556	7 292 853	11 782 848	583 165
2014/15	29 344 977	1 893 010	5 004 669	8 377 575	13 290 951	778 772

The NPO sector in 2012/13 improved coverage by R281 509 contributing 1.2% of GERD. In 2014/15 the NPO sector improved coverage by R185 302 contributing 0.6% of GERD.

Table C.2: R&D expenditure by sector, constant 2010 Rand values (2005/06 to 2014/15)

YEAR	GERD	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT*
	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	20 366 181	1 215 761	3 025 720	3 932 707	11 865 959	326 041
2006/07	22 375 578	1 383 329	3 717 463	4 467 926	12 518 999	287 863
2007/08	23 173 761	1 436 413	3 591 152	4 506 664	13 361 804	277 729
2008/09	24 056 681	1 303 016	3 586 992	4 792 079	14 099 456	275 139
2009/10	22 285 514	1 135 087	3 677 697	5 425 204	11 846 692	200 833
2010/11	20 253 805	1 011 340	3 596 023	5 424 602	10 059 010	162 830
2011/12	20 824 028	1 158 602	3 497 064	6 197 006	9 811 392	159 965
2012/13	21 213 083	1 277 438	3 577 690	6 516 582	9 393 640	447 730
2013/14	21 515 355	1 422 992	3 609 196	6 114 761	9 879 440	488 960
2014/15	23 256 723	1 500 150	3 966 042	6 638 963	10 532 658	617 153

The NPO sector in 2012/13 improved coverage by R281 509 contributing 1.2% of GERD. In 2014/15 the NPO sector improved coverage by R185 302 contributing 0.6% of GERD.

Table C.3: R&D expenditure composition by sector (2005/06 to 2014/15)

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT*
	%	%	%	%	%
2005/06	6.0	14.9	19.3	58.3	1.6
2006/07	6.2	16.6	20.0	55.9	1.3
2007/08	6.2	15.5	19.4	57.7	1.2
2008/09	5.4	14.9	19.9	58.6	1.1
2009/10	5.1	16.5	24.3	53.2	0.9
2010/11	5.0	17.8	26.8	49.7	0.8
2011/12	5.6	16.8	29.8	47.1	0.8
2012/13	6.0	16.9	30.7	44.3	2.1
2013/14	6.6	16.8	28.4	45.9	2.3
2014/15	6.5	17.1	28.5	45.3	2.7

The NPO sector in 2012/13 improved coverage by R281 509 contributing 1.2% of GERD. In 2014/15 the NPO improved coverage by R185 302 contributing 0.6% of GERD.

Table C.4: R&D expenditure as a percentage of GDP by sector (2005/06 to 2014/15)

YEAR	GERD/GDP	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%	%
2005/06	0.86	0.05	0.13	0.17	0.50	0.01
2006/07	0.90	0.06	0.15	0.18	0.50	0.01
2007/08	0.88	0.05	0.14	0.17	0.51	0.01
2008/09	0.89	0.05	0.13	0.18	0.52	0.01
2009/10	0.84	0.04	0.14	0.20	0.44	0.01
2010/11	0.74	0.04	0.13	0.20	0.37	0.01
2011/12	0.73	0.04	0.12	0.22	0.35	0.01
2012/13	0.73	0.04	0.12	0.22	0.32	0.02
2013/14	0.73	0.05	0.12	0.21	0.33	0.02
2014/15	0.77	0.05	0.13	0.22	0.35	0.02

Table C.5: R&D expenditure by type of research (2005/06 to 2014/15)

YEAR	GERD	BASIC RESEARCH	APPLIED RESEARCH	EXPERIMENTAL DEVELOPMENT
	R'000	R'000	R'000	R'000
2005/06	14 149 238	2 649 755	5 056 379	6 443 104
2006/07	16 520 728	3 075 263	5 794 785	7 650 671
2007/08	18 624 013	3 830 806	6 373 681	8 419 526
2008/09	21 041 046	4 243 156	7 013 082	9 784 808
2009/10	20 954 676	5 553 399	6 578 902	8 822 375
2010/11	20 253 804	4 848 283	8 058 799	7 346 722
2011/12	22 209 192	5 439 561	9 388 273	7 381 358
2012/13	23 871 219	6 030 827	11 064 247	6 776 146
2013/14	25 660 573	6 102 085	12 132 211	7 426 277
2014/15	29 344 977	7 133 213	14 331 016	7 880 748

Table C.6: Proportional R&D expenditure by type of research (2005/06 to 2014/15)

YEAR	BASIC RESEARCH	APPLIED RESEARCH	EXPERIMENTAL DEVELOPMENT
	%	%	%
2005/06	18.7	35.7	45.5
2006/07	18.6	35.1	46.3
2007/08	20.6	34.2	45.2
2008/09	20.2	33.3	46.5
2009/10	26.5	31.4	42.1
2010/11	23.9	39.8	36.3
2011/12	24.5	42.3	33.2
2012/13	25.3	46.3	28.4
2013/14	23.8	47.3	28.9
2014/15	24.3	48.8	26.9

Table C.7: R&D expenditure by accounting category (2005/06 to 2014/15)

YEAR		CAPITAL EXPENDITURE ON R&D			CURRENT EXPENDITURE ON R&D			
	GERD	LAND: BUILDINGS AND OTHER STRUCTURES	VEHICLES, PLANT, MACHINERY, EQUIPMENT	SUBTOTAL: CAPITAL EXPENDITURE	LABOUR COSTS	TOTAL COST OF R&D POSTGRADUATE STUDENTS	OTHER CURRENT EXPENDITURE	SUBTOTAL: CURRENT EXPENDITURE
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	14 149 239	347 342	1 619 871	1 967 213	6 178 386	313 645	5 689 995	12 182 026
2006/07	16 520 586	319 868	1 357 234	1 677 102	7 526 757	438 486	6 878 241	14 843 484
2007/08	18 624 013	367 757	1 686 567	2 054 324	8 171 240	495 128	7 903 321	16 569 689
2008/09	21 041 046	326 145	3 091 898	3 418 043	8 661 361	532 883	8 428 759	17 623 003
2009/10	20 954 677	623 089	2 067 728	2 690 817	8 909 301	581 140	8 773 419	18 263 860
2010/11	20 253 805	472 205	1 714 845	2 187 050	8 353 254	756 930	8 956 571	18 066 755
2011/12	22 209 192	454 321	2 215 416	2 669 737	9 534 138	1 074 207	8 931 110	19 539 455
2012/13	23 871 219	495 842	1 747 183	2 243 025	11 922 169	1 186 653	8 519 372	21 628 194
2013/14	25 660 573	529 575	1 857 913	2 387 488	13 304 413	1 224 611	8 744 061	23 273 085
2014/15	29 344 977	805 961	2 311 181	3 117 142	14 443 903	1 579 088	10 204 844	26 227 835

Table C.8: Proportional R&D expenditure by accounting category (2005/06 to 2014/15)

YEAR	CAPITAL EXPENDITURE ON R&D			CURRENT EXPENDITURE ON R&D			
	LAND: BUILDINGS AND OTHER STRUCTURES	VEHICLES, PLANT, MACHINERY, EQUIPMENT	SUBTOTAL: CAPITAL EXPENDITURE	LABOUR COSTS	TOTAL COST OF R&D POSTGRADUATE STUDENTS	OTHER CURRENT EXPENDITURE	SUBTOTAL: CURRENT EXPENDITURE
	%	%	%	%	%	%	%
2005/06	2.5	11.4	13.9	43.7	2.2	40.2	86.1
2006/07	1.9	8.2	10.2	45.6	2.7	41.6	89.8
2007/08	2.0	9.1	11.0	43.9	2.7	42.4	89.0
2008/09	1.6	14.7	16.2	41.2	2.5	40.1	83.8
2009/10	3.0	9.9	12.8	42.5	2.8	41.9	87.2
2010/11	2.3	8.5	10.8	41.2	3.7	44.2	89.2
2011/12	2.0	10.0	12.0	42.9	4.8	40.2	88.0
2012/13	2.1	7.3	9.4	49.9	5.0	35.7	90.6
2013/14	2.1	7.2	9.3	51.8	4.8	34.1	90.7
2014/15	2.7	7.9	10.6	49.2	5.4	34.8	89.4

Table C.9: Expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

YEAR	GERD	BIOTECHNOLOGY	NANOTECHNOLOGY
	R'000	R'000	R'000
2005/06	**14 149 238**	454 332	236 479
2006/07	**16 520 584**	592 777	310 078
2007/08	**18 624 014**	648 704	248 521
2008/09	**21 041 046**	801 640	388 380
2009/10	**20 954 677**	917 917	423 865
2010/11	**20 253 805**	1 142 337	414 529
2011/12	**22 209 192**	1 065 286	596 072
2012/13	**23 871 219**	1 179 478	662 634
2013/14	**25 660 573**	1 266 325	664 139
2014/15	**29 344 977**	1 576 727	818 919

Table C.10: Proportional expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

YEAR	BIOTECHNOLOGY	NANOTECHNOLOGY
	%	%
2005/06	3.2	1.7
2006/07	3.6	1.9
2007/08	3.5	1.3
2008/09	3.8	1.8
2009/10	4.4	2.0
2010/11	5.6	2.0
2011/12	4.8	2.7
2012/13	4.9	2.8
2013/14	4.9	2.6
2014/15	5.4	2.8

Table C.11: R&D expenditure on selected areas of interest (2005/06 to 2014/15)

YEAR	GERD	OPEN SOURCE SOFTWARE	TUBERCULOSIS (TB), HIV/AIDS, MALARIA	ENVIRONMENT / ENVIRONMENT RELATED	NEW MATERIALS
	R'000	R'000	R'000	R'000	R'000
2005/06	14 149 239	101 937	733 338	N/A	308 800
2006/07	16 520 584	192 786	934 760	N/A	336 970
2007/08	18 624 013	254 808	1 120 028	N/A	298 746
2008/09	21 041 046	218 289	1 616 410	N/A	514 242
2009/10	20 954 677	172 712	1 816 901	N/A	559 021
2010/11	20 253 805	157 790	2 052 521	N/A	722 167
2011/12	22 209 192	181 320	2 006 625	1 215 855	783 232
2012/13	23 871 219	211 264	2 478 422	1 051 035	1 327 832
2013/14	25 660 573	339 065	2 867 954	1 088 094	794 016
2014/15	29 344 977	818 735	3 008 176	1 996 195	1 053 783

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.12: Proportional R&D expenditure on selected areas of interest (2005/06 to 2014/15)

YEAR	OPEN SOURCE SOFTWARE	TUBERCULOSIS (TB), HIV/AIDS, MALARIA	ENVIRONMENT / ENVIRONMENT RELATED	NEW MATERIALS
	%	%	%	%
2005/06	0.7	5.2	N/A	2.2
2006/07	1.2	5.7	N/A	2.0
2007/08	1.4	6.0	N/A	1.6
2008/09	1.0	7.7	N/A	2.4
2009/10	0.8	8.7	N/A	2.7
2010/11	0.8	10.1	N/A	3.6
2011/12	0.8	9.0	5.5	3.5
2012/13	0.9	10.4	4.4	5.6
2013/14	1.3	11.2	4.2	3.1
2014/15	2.8	10.3	6.8	3.6

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.13: R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural sciences, technology and engineering	**12 404 829**	**14 568 971**	**16 306 332**	**18 419 289**	**18 236 046**	**17 274 483**	**18 924 485**	**19 384 947**	**20 587 093**	**23 687 304**
Mathematical sciences	291 122	315 773	341 624	397 512	414 234	530 693	636 153	634 658	627 017	636 084
Physical sciences	551 426	655 378	793 006	952 441	648 657	305 701	338 098	370 616	379 813	582 267
Chemical sciences	591 258	595 579	784 145	1 056 848	860 745	865 345	1 273 588	1 460 180	1 305 139	1 299 969
Earth sciences	365 771	426 950	524 133	563 619	402 949	403 848	409 212	499 210	498 427	690 040
Information, computer and communication technologies	1 866 314	2 314 243	2 598 218	2 763 320	3 272 679	2 808 681	2 852 251	2 000 453	1 994 502	2 946 625
Applied sciences and technologies	1 541 893	1 812 402	1 832 546	1 905 397	1 740 755	2 151 557	2 114 322	2 252 175	2 164 025	1 555 897
Engineering sciences	2 950 059	3 457 912	4 189 408	5 135 032	4 580 166	3 600 159	3 775 247	3 903 931	4 315 051	5 485 812
Biological sciences	705 410	798 835	723 280	744 144	800 435	1 326 076	1 350 716	1 555 035	1 578 516	1 398 611
Agricultural sciences	961 166	1 138 873	1 264 628	1 147 706	1 445 847	1 307 191	1 710 860	1 810 114	2 196 122	2 656 038
Medical and health sciences	2 088 399	2 489 242	2 616 439	3 139 245	3 506 472	3 461 304	3 819 180	4 107 641	4 668 417	5 459 721
Environmental sciences	194 867	216 710	222 514	248 625	229 186	352 139	439 719	587 113	611 007	533 065
Material sciences	246 125	284 530	365 813	306 828	254 092	109 551	166 411	155 379	192 199	368 315
Marine sciences	51 019	62 544	50 579	58 573	79 830	52 238	38 726	48 442	56 857	74 858
Division 2: Social sciences and humanities	**1 744 411**	**1 951 613**	**2 317 681**	**2 621 757**	**2 718 631**	**2 979 322**	**3 284 707**	**4 486 272**	**5 073 480**	**5 657 674**
Social sciences	1 393 471	1 559 043	1 809 308	2 024 801	2 233 521	2 512 714	2 790 339	3 999 853	4 489 054	5 000 339
Humanities	350 940	392 570	508 373	596 956	485 110	466 608	494 368	486 420	584 426	657 335
Total	**14 149 240**	**16 520 584**	**18 624 013**	**21 041 046**	**20 954 677**	**20 253 805**	**22 209 192**	**23 871 219**	**25 660 573**	**29 344 977**

Table C.14: Proportional R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural sciences, technology and engineering	**87.7**	**88.2**	**87.6**	**87.5**	**87.0**	**85.3**	**85.2**	**81.2**	**80.2**	**80.7**
Mathematical sciences	2.1	1.9	1.8	1.9	2.0	2.6	2.9	2.7	2.4	2.2
Physical sciences	3.9	4.0	4.3	4.5	3.1	1.5	1.5	1.6	1.5	2.0
Chemical sciences	4.2	3.6	4.2	5.0	4.1	4.3	5.7	6.1	5.1	4.4
Earth sciences	2.6	2.6	2.8	2.7	1.9	2.0	1.8	2.1	1.9	2.4
Information, computer and communication technologies	13.2	14.0	14.0	13.1	15.6	13.9	12.8	8.4	7.8	10.0
Applied sciences and technologies	10.9	11.0	9.8	9.1	8.3	10.6	9.5	9.4	8.4	5.3
Engineering sciences	20.8	20.9	22.5	24.4	21.9	17.8	17.0	16.4	16.8	18.7
Biological sciences	5.0	4.8	3.9	3.5	3.8	6.5	6.1	6.5	6.2	4.8
Agricultural sciences	6.8	6.9	6.8	5.5	6.9	6.5	7.7	7.6	8.6	9.1
Medical and health sciences	14.8	15.1	14.0	14.9	16.7	17.1	17.2	17.2	18.2	18.6
Environmental sciences	1.4	1.3	1.2	1.2	1.1	1.7	2.0	2.5	2.4	1.8
Material sciences	1.7	1.7	2.0	1.5	1.2	0.5	0.7	0.7	0.7	1.3
Marine sciences	0.4	0.4	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.3
Division 2: Social sciences and humanities	**12.3**	**11.8**	**12.4**	**12.5**	**13.0**	**14.7**	**14.8**	**18.8**	**19.8**	**19.3**
Social sciences	9.8	9.4	9.7	9.6	10.7	12.4	12.6	16.8	17.5	17.0
Humanities	2.5	2.4	2.7	2.8	2.3	2.3	2.2	2.0	2.3	2.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.15: R&D expenditure by socio-economic objectives (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVES	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**906 174**	**1 091 516**	**1 135 278**	**1 196 200**	**1 276 269**	**1 341 460**	**1 069 289**	**1 351 337**	**1 386 428**	**1 826 784**
Defence	906 174	1 091 516	1 135 278	1 196 200	1 276 269	1 341 460	1 069 289	1 351 337	1 386 428	1 826 784
Division 2: Economic development	**8 817 223**	**10 017 805**	**11 724 590**	**13 312 043**	**12 341 036**	**11 231 879**	**12 174 897**	**12 223 017**	**14 166 615**	**15 359 534**
Economic development unclassified	115 029	150 668	171 520	209 400	0	0	0	0	0	0
Plant production and plant primary products	731 188	792 487	931 733	853 243	1 055 316	1 045 114	1 137 706	1 218 852	1 739 038	1 364 018
Animal production and animal primary products	272 077	337 029	279 914	289 909	354 639	293 873	565 729	598 602	803 403	694 423
Mineral resources (excluding energy)	1 164 691	931 909	1 075 821	995 552	1 212 226	1 123 063	1 065 384	1 143 762	1 351 239	1 779 068
Energy resources	438 889	574 570	709 891	1 185 455	407 091	274 220	273 390	294 820	288 314	197 072
Energy supply	273 823	347 632	364 876	515 216	540 463	623 953	676 490	509 128	590 980	778 805
Manufacturing	1 859 779	2 187 583	2 676 911	2 998 301	2 602 319	2 374 657	2 489 799	2 394 239	2 608 207	2 619 974
Construction	745 634	937 406	1 150 733	1 461 157	521 289	311 897	392 439	426 960	450 907	270 226
Transport	438 848	515 262	595 065	704 404	924 183	905 571	984 225	992 504	1 115 027	998 136
Information and communication services	948 734	1 035 459	1 240 972	1 274 761	1 381 989	1 104 273	1 271 591	1 159 823	1 124 614	1 661 660
Commercial services	1 145 775	1 380 085	1 457 410	1 499 495	2 045 919	1 849 534	1 866 449	1 895 734	2 443 529	2 701 523
Economic framework	304 864	349 517	548 517	604 404	598 312	600 662	611 868	715 759	689 386	1 331 844
Natural resources	377 891	478 198	521 228	720 746	697 290	725 062	839 825	872 835	961 971	962 787
Division 3: Society	**2 316 725**	**2 731 152**	**2 827 775**	**3 225 179**	**3 276 198**	**3 247 428**	**3 861 888**	**4 473 657**	**4 585 825**	**5 885 267**
Society unclassified	115 029	150 668	171 520	209 400	0	0	0	0	0	0
Health	1 522 650	1 725 977	1 790 225	2 013 993	2 247 629	2 089 570	2 301 764	2 942 262	2 859 623	3 638 036
Education and training	382 105	418 971	389 138	465 475	458 060	442 181	554 462	672 473	882 976	1 346 974
Social development and community services	296 942	435 536	476 892	536 312	570 508	715 677	1 005 662	858 922	843 226	900 257
Division 4: Environment	**604 769**	**711 134**	**854 997**	**1 006 106**	**992 840**	**735 909**	**905 570**	**979 981**	**861 976**	**1 414 524**
Environment unclassified	38 343	50 223	57 173	69 800	0	0	0	0	0	0
Environmental knowledge	303 892	348 158	375 069	488 204	463 786	310 888	398 977	443 987	388 688	828 768
Environmental aspects of development	118 802	130 144	195 300	176 503	181 907	189 344	216 406	258 144	226 299	288 823
Environmental and other aspects	143 732	182 609	227 455	271 599	347 147	235 677	290 186	277 849	246 989	296 934

Division 5: Advancement of knowledge	**1 504 349**	**1 968 977**	**2 081 375**	**2 301 517**	**3 068 334**	**3 697 128**	**4 197 547**	**4 843 227**	**4 659 729**	**4 858 868**
Advancement of knowledge unclassified	115 029	150 668	171 520	209 400	0	0	0	0	0	0
Natural sciences, technologies and engineering	925 287	1 372 203	1 456 357	1 604 035	2 036 622	2 672 224	3 025 841	3 497 129	3 407 325	3 445 842
Social sciences and humanities	464 032	446 107	453 498	488 082	1 031 712	1 024 904	1 171 706	1 346 098	1 252 404	1 413 026
Total	**14 149 239**	**16 520 584**	**18 624 015**	**21 041 046**	**20 954 677**	**20 253 805**	**22 209 192**	**23 871 219**	**25 660 573**	**29 344 977**

Table C.16: Proportional R&D expenditure by socio-economic objectives (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVES	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**6.4**	**6.6**	**6.1**	**5.7**	**6.1**	**6.6**	**4.8**	**5.7**	**5.4**	**6.2**
Defence	6.4	6.6	6.1	5.7	6.1	6.6	4.8	5.7	5.4	6.2
Division 2: Economic development	**62.3**	**60.6**	**63.0**	**63.3**	**58.9**	**55.5**	**54.8**	**51.2**	**55.2**	**52.3**
Economic development unclassified	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	5.2	4.8	5.0	4.1	5.0	5.2	5.1	5.1	6.8	4.6
Animal production and animal primary products	1.9	2.0	1.5	1.4	1.7	1.5	2.5	2.5	3.1	2.4
Mineral resources (excluding energy)	8.2	5.6	5.8	4.7	5.8	5.5	4.8	4.8	5.3	6.1
Energy resources	3.1	3.5	3.8	5.6	1.9	1.4	1.2	1.2	1.1	0.7
Energy supply	1.9	2.1	2.0	2.4	2.6	3.1	3.0	2.1	2.3	2.7
Manufacturing	13.1	13.2	14.4	14.2	12.4	11.7	11.2	10.0	10.2	8.9
Construction	5.3	5.7	6.2	6.9	2.5	1.5	1.8	1.8	1.8	0.9
Transport	3.1	3.1	3.2	3.3	4.4	4.5	4.4	4.2	4.3	3.4
Information and communication services	6.7	6.3	6.7	6.1	6.6	5.5	5.7	4.9	4.4	5.7
Commercial services	8.1	8.4	7.8	7.1	9.8	9.1	8.4	7.9	9.5	9.2
Economic framework	2.2	2.1	2.9	2.9	2.9	3.0	2.8	3.0	2.7	4.5
Natural resources	2.7	2.9	2.8	3.4	3.3	3.6	3.8	3.7	3.7	3.3
Division 3: Society	**16.4**	**16.5**	**15.2**	**15.3**	**15.6**	**16.0**	**17.4**	**18.7**	**17.9**	**20.1**
Society unclassified	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	10.8	10.4	9.6	9.6	10.7	10.3	10.4	12.3	11.1	12.4
Education and training	2.7	2.5	2.1	2.2	2.2	2.2	2.5	2.8	3.4	4.6
Social development and community services	2.1	2.6	2.6	2.5	2.7	3.5	4.5	3.6	3.3	3.1
Division 4: Environment	**4.3**	**4.3**	**4.6**	**4.8**	**4.7**	**3.6**	**4.1**	**4.1**	**3.4**	**4.8**
Environment unclassified	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	2.1	2.1	2.0	2.3	2.2	1.5	1.8	1.9	1.5	2.8

Environmental aspects of development	0.8	0.8	1.0	0.8	0.9	0.9	1.0	1.1	0.9	1.0
Environmental and other aspects	1.0	1.1	1.2	1.3	1.7	1.2	1.3	1.2	1.0	1.0
Division 5: Advancement of knowledge	**10.6**	**11.9**	**11.2**	**10.9**	**14.6**	**18.3**	**18.9**	**20.3**	**18.2**	**16.6**
Advancement of knowledge unclassified	0.8	0.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	6.5	8.3	7.8	7.6	9.7	13.2	13.6	14.6	13.3	11.7
Social sciences and humanities	3.3	2.7	2.4	2.3	4.9	5.1	5.3	5.6	4.9	4.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.17: R&D expenditure by province (2005/06 to 2014/15)

YEAR	GERD	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMA-LANGA	NORTHERN CAPE	NORTH-WEST	WESTERN CAPE
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	**14 149 238**	672 008	718 908	7 173 590	1 532 158	197 054	340 773	138 426	323 838	3 052 483
2006/07	**16 520 584**	752 303	944 829	8 447 470	1 809 013	240 952	369 535	180 923	402 461	3 373 098
2007/08	**18 624 014**	826 925	1 098 210	9 620 752	2 081 166	263 784	452 950	169 937	453 574	3 656 717
2008/09	**21 041 046**	889 081	1 562 720	10 981 587	2 210 336	286 157	379 123	174 453	487 376	4 070 214
2009/10	**20 954 677**	1 121 484	1 370 779	10 377 381	2 167 048	340 379	393 822	217 774	540 951	4 425 059
2010/11	**20 253 805**	1 048 959	1 332 224	9 772 806	2 290 711	395 042	397 878	250 320	532 456	4 233 409
2011/12	**22 209 192**	1 278 870	1 718 602	10 391 272	2 515 736	583 857	522 963	341 136	732 363	4 124 394
2012/13	**23 871 219**	1 463 589	1 714 473	10 602 434	3 013 372	619 437	612 031	400 974	890 364	4 554 545
2013/14	**25 660 573**	1 478 850	1 943 131	11 975 916	2 752 543	444 015	615 773	473 722	1 027 448	4 949 174
2014/15	**29 344 977**	1 734 411	1 456 461	13 686 734	3 187 481	628 607	859 201	575 584	1 402 742	5 813 758

Table C.18: Proportional R&D expenditure by province (2005/06 to 2014/15)

YEAR	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMA-LANGA	NORTHERN CAPE	NORTH-WEST	WESTERN CAPE
	%	%	%	%	%	%	%	%	%
2005/06	4.7	5.1	50.7	10.8	1.4	2.4	1.0	2.3	21.6
2006/07	4.6	5.7	51.1	11.0	1.5	2.2	1.1	2.4	20.4
2007/08	4.4	5.9	51.7	11.2	1.4	2.4	0.9	2.4	19.6
2008/09	4.2	7.4	52.2	10.5	1.4	1.8	0.8	2.3	19.3
2009/10	5.4	6.5	49.5	10.3	1.6	1.9	1.0	2.6	21.1
2010/11	5.2	6.6	48.3	11.3	2.0	2.0	1.2	2.6	20.9
2011/12	5.8	7.7	46.8	11.3	2.6	2.4	1.5	3.3	18.6
2012/13	6.1	7.2	44.4	12.6	2.6	2.6	1.7	3.7	19.1
2013/14	5.8	7.6	46.7	10.7	1.7	2.4	1.8	4.0	19.3
2014/15	5.9	5.0	46.6	10.9	2.1	2.9	2.0	4.8	19.8

C.1.2. Source of R&D funds

Table C.19: Funding for R&D by source (2005/06 to 2014/15)

YEAR	TOTAL FUNDS	GOVERNMENT*	BUSINESS	OTHER SOUTH AFRICAN SOURCES**	FOREIGN SOURCES
	R'000	R'000	R'000	R'000	R'000
2005/06	**14 149 239**	5 403 955	6 206 837	620 849	1 917 598
2006/07	**16 520 570**	6 672 138	7 399 660	701 907	1 746 865
2007/08	**18 624 059**	8 510 101	7 945 949	180 927	1 987 082
2008/09	**21 041 046**	9 497 510	8 973 490	175 219	2 394 827
2009/10	**20 954 676**	9 313 028	8 907 527	195 682	2 538 439
2010/11	**20 253 805**	9 018 874	8 128 246	661 676	2 445 009
2011/12	**22 209 192**	9 561 917	8 663 105	653 674	3 330 496
2012/13	**23 871 219**	10 831 893	9 152 042	770 300	3 116 984
2013/14	**25 660 573**	11 007 083	10 615 902	722 361	3 315 227
2014/15	**29 344 977**	12 873 458	11 981 974	923 530	3 566 015

*Includes science council and university own funds.

**Includes funds from higher education institutions, not-for-profit organisations and individual donations disbursed to all sectors.

Table C.20: Proportional funding for R&D by source (2005/06 to 2014/15)

YEAR	GOVERNMENT*	BUSINESS	OTHER SOUTH AFRICAN SOURCES**	FOREIGN SOURCES
	%	%	%	%
2005/06	38.2	43.9	4.4	13.6
2006/07	40.4	44.8	4.2	10.6
2007/08	45.7	42.7	1.0	10.7
2008/09	45.1	42.6	0.8	11.4
2009/10	44.4	42.5	0.9	12.1
2010/11	44.5	40.1	3.3	12.1
2011/12	43.1	39.0	2.9	15.0
2012/13	45.4	38.3	3.2	13.1
2013/14	42.9	41.4	2.8	12.9
2014/15	43.9	40.8	3.1	12.2

*Includes science council and university own funds.

**Includes funds from higher education institutions, not-for-profit organisations and individual donations disbursed to all sectors.

Table C.21: Sources of R&D funding by sector, amount and as a percentage of total funds (2014/15)

SOURCE OF FUNDS	TOTAL		GOVERNMENT		SCIENCE COUNCILS		HIGHER EDUCATION		BUSINESS		NOT-FOR-PROFIT	
	R'000	%	R'000	%	R'000	%	R'000	%	R'000	%	R'000	%
Own funds	**16 563 722**	**56.4**	**1 231 883**	**65.1**	**542 418**	**10.8**	**4 140 267**	**49.4**	**10 548 621**	**79.4**	**100 532**	**12.9**
Internal sources	16 563 722	56.4	1 231 883	65.1	542 418	10.8	4 140 267	49.4	10 548 621	79.4	100 532	12.9
Government	**6 958 890**	**23.7**	**479 925**	**25.4**	**3 776 975**	**75.5**	**1 880 305**	**22.4**	**690 396**	**5.2**	**131 288**	**16.9**
Grants	3 183 816	10.8	464 840	24.6	2 422 984	48.4	N/A	N/A	238 443	1.8	57 548	7.4
Contracts	1 894 769	6.5	15 085	0.8	1 353 991	27.1	N/A	N/A	451 953	3.4	73 740	9.5
All other	1 880 305	6.4	NA	N/A	NA	N/A	1 880 305	22.4	NA	N/A	NA	N/A
Business	**1 433 353**	**4.9**	**290**	**0.0**	**222 892**	**4.5**	**885 280**	**10.6**	**261 807**	**2.0**	**63 084**	**8.1**
Local business	1 433 353	4.9	290	0.0	222 892	4.5	885 280	10.6	261 807	2.0	63 084	8.1
Other SA sources	**822 998**	**2.8**	**1 438**	**0.1**	**31 169**	**0.6**	**391 991**	**4.7**	**371 304**	**2.8**	**27 096**	**3.5**
Higher education	47 885	0.2	100	0.0	7 190	0.1	35 963	0.4	1 420	0.0	3 212	0.4
Not-for-profit	516 737	1.8	1 294	0.1	23 979	0.5	101 037	1.2	367 217	2.8	23 210	3.0
Individual donations	258 376	0.9	44	0.0	0	0.0	254 991	3.0	2 667	0.0	674	0.1
Foreign	**3 566 015**	**12.2**	**179 473**	**9.5**	**431 215**	**8.6**	**1 079 732**	**12.9**	**1 418 823**	**10.7**	**456 772**	**58.7**
All sources	3 566 015	12.2	179 473	9.5	431 215	8.6	1 079 732	12.9	1 418 823	10.7	456 772	58.7
Total	**29 344 977**	**100.0**	**1 893 010**	**100**	**5 004 669**	**100**	**8 377 575**	**100**	**13 290 951**	**100**	**778 772**	**100**

*Note: N/A indicates that data were not collected.

Table C.22: Government-funded R&D by sector (2005/06 to 2014/15)

YEAR	TOTAL	GOVERNMENT*	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	**5 800 628**	755 656	1 591 534	2 093 228	1 331 740	28 470
2006/07	**7 193 363**	937 005	2 134 960	2 327 134	1 764 448	29 816
2007/08	**8 510 055**	1 091 049	2 297 322	2 761 557	2 326 728	33 399
2008/09	**9 497 510**	1 068 527	2 602 458	3 226 674	2 567 140	32 711
2009/10	**9 313 028**	1 008 475	2 917 683	3 918 620	1 429 766	38 484
2010/11	**9 018 874**	990 290	2 932 489	4 222 092	832 173	41 830
2011/12	**9 561 917**	1 112 307	3 310 894	4 598 426	499 298	40 992
2012/13	**10 831 893**	1 269 337	3 368 555	5 395 871	683 669	114 461
2013/14	**11 007 083**	1 436 141	3 412 790	5 369 334	685 670	103 148
2014/15	**12 873 458**	1 711 809	4 319 393	6 020 572	690 396	131 288

*Note: Includes science council and university own funds.

Table C.23: Proportional government-funded R&D by sector (2005/06 to 2014/15)

YEAR	GOVERNMENT*	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2005/06	13.0	27.4	36.1	23.0	0.5
2006/07	13.0	29.7	32.4	24.5	0.4
2007/08	12.8	27.0	32.5	27.3	0.4
2008/09	11.3	27.4	34.0	27.0	0.3
2009/10	10.8	31.3	42.1	15.4	0.4
2010/11	11.0	32.5	46.8	9.2	0.5
2011/12	11.6	34.6	48.1	5.2	0.4
2012/13	11.7	31.1	49.8	6.3	1.1
2013/14	13.0	31.0	48.8	6.2	0.9
2014/15	13.3	33.6	46.8	5.4	1.0

*Note: Includes science council and university own funds.

Table C.24: Business-funded R&D by sector (2005/06 to 2014/15)

YEAR	TOTAL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	**6 206 837**	11 000	220 698	316 740	5 630 983	27 416
2006/07	**7 399 659**	13 067	265 441	682 493	6 414 319	24 339
2007/08	**7 945 949**	5 343	263 098	519 804	7 133 913	23 791
2008/09	**8 973 490**	15 980	137 356	454 184	8 339 379	26 591
2009/10	**8 907 527**	2 326	120 528	609 250	8 142 996	32 427
2010/11	**8 128 246**	2 406	198 206	367 340	7 528 667	31 627
2011/12	**8 663 105**	1 355	67 614	505 510	8 056 545	32 081
2012/13	**9 152 042**	11 552	135 729	577 527	8 402 340	24 894
2013/14	**10 615 902**	1 759	419 469	588 598	9 552 717	53 359
2014/15	**11 981 974**	290	222 892	885 280	10 810 428	63 084

Table C.25: Proportional business-funded R&D by sector (2005/06 to 2014/15)

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2005/06	0.2	3.6	5.1	90.7	0.4
2006/07	0.2	3.6	9.2	86.7	0.3
2007/08	0.1	3.3	6.5	89.8	0.3
2008/09	0.2	1.5	5.1	92.9	0.3
2009/10	0.0	1.4	6.8	91.4	0.4
2010/11	0.0	2.4	4.5	92.6	0.4
2011/12	0.0	0.8	5.8	93.0	0.4
2012/13	0.1	1.5	6.3	91.8	0.3
2013/14	0.0	4.0	5.5	90.0	0.5
2014/15	0.0	1.9	7.4	90.2	0.5

Table C.26: Foreign-funded R&D by sector (2005/06 to 2014/15)

YEAR	TOTAL	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	R'000	R'000	R'000	R'000	R'000	R'000
2005/06	**1 917 598**	58 714	254 183	305 590	1 196 771	102 340
2006/07	**1 746 996**	51 660	320 868	278 708	977 087	118 673
2007/08	**1 987 082**	56 172	298 906	320 286	1 180 193	131 525
2008/09	**2 394 827**	53 348	392 008	410 038	1 396 033	143 400
2009/10	**2 538 439**	54 129	416 571	443 109	1 538 917	85 713
2010/11	**2 445 009**	16 236	460 580	473 145	1 442 334	52 714
2011/12	**3 330 496**	118 127	321 257	1 272 173	1 562 277	56 662
2012/13	**3 116 984**	143 994	510 846	1 010 244	1 189 865	262 035
2013/14	**3 315 227**	258 531	454 527	1 042 627	1 226 966	332 576
2014/15	**3 566 015**	179 473	431 215	1 079 732	1 418 823	456 772

Table C.27: Proportional foreign-funded R&D by sector (2005/06 to 2014/15)

YEAR	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION	BUSINESS	NOT-FOR-PROFIT
	%	%	%	%	%
2005/06	3.1	13.3	15.9	62.4	5.3
2006/07	3.0	18.4	16.0	55.9	6.8
2007/08	2.8	15.0	16.1	59.4	6.6
2008/09	2.2	16.4	17.1	58.3	6.0
2009/10	2.1	16.4	17.5	60.6	3.4
2010/11	0.7	18.8	19.4	59.0	2.2
2011/12	3.5	9.6	38.2	46.9	1.7
2012/13	4.6	16.4	32.4	38.2	8.4
2013/14	7.8	13.7	31.4	37.0	10.0
2014/15	5.0	12.1	30.3	39.8	12.8

C.1.3. R&D personnel

Table C.28: R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	R&D PERSONNEL			RESEARCHERS			TECHNICIANS		OTHER R&D PERSONNEL	
	R&D PERSONNEL (HEADCOUNTS*)	R&D PERSONNEL (FTEs)	R&D PERSONNEL (FTEs) PER 1000 IN TOTAL EMPLOYMENT	RESEARCHERS (HEADCOUNTS)	RESEARCHERS (FTEs)	RESEARCHERS (FTEs) PER 1 000 IN TOTAL EMPLOYMENT	TECHNICIANS (HEADCOUNTS)	TECHNICIANS (FTEs)	OTHER R&D PERSONNEL (HEADCOUNT)	OTHER R&D PERSONNEL (FTEs)
2005/06	**57 275**	**28 798.2**	**2.4**	39 266	17 303.0	1.5	8 325	5 248.2	9 684	6 246.9
2006/07	**58 706**	**30 984.4**	**2.5**	39 591	18 573.5	1.5	9 761	6 331.8	9 354	6 080.0
2007/08	**59 334**	**31 354.4**	**2.4**	40 084	19 320.3	1.5	9 476	6 060.5	9 784	5 973.7
2008/09	**58 895**	**30 801.6**	**2.2**	39 955	19 384.3	1.4	9 761	6 022.4	9 179	5 394.8
2009/10	**59 494**	**30 891.3**	**2.3**	40 797	19 793.1	1.5	9 443	5 792.2	9 254	5 306.0
2010/11	**55 531**	**29 486.4**	**2.2**	37 901	18 719.6	1.4	8 559	5 409.6	9 071	5 357.3
2011/12	**59 487**	**30 978.4**	**2.3**	40 653	20 115.1	1.5	9 260	5 566.9	9 574	5 296.5
2012/13	**64 917**	**35 050.3**	**2.4**	42 828	21 382.4	1.5	10 790	6 582.3	11 299	7 085.5
2013/14	**68 838**	**37 956.5**	**2.5**	45 935	23 346.0	1.6	10 800	6 905.5	12 103	7 705.0
2014/15	**72 400**	**38 465.0**	**2.5**	48 479	23 571.9	1.5	12 183	7 731.3	11 738	7 161.9

Table C.29: R&D personnel in headcounts and full-time equivalents by occupation and gender (2012/13 to 2014/15)

YEAR	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	42 828	24 104	18 724	21 382.4	12 097.9	9 284.5	49.9
Technicians	10 790	6 902	3 888	6 582.3	4 181.9	2 400.4	61.0
Other personnel	11 299	5 562	5 737	7 085.5	3 688.8	3 396.7	62.7
Total	**64 917**	**36 568**	**28 349**	**35 050.3**	**19 968.6**	**15 081.6**	**54.0**
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	45 935	25 704	20 231	23 346.0	13 180.8	10 165.2	50.8
Technicians directly supporting R&D	10 800	6 900	3 900	6 905.5	4 340.3	2 565.2	63.9
Other personnel directly supporting R&D	12 103	6 003	6 100	7 705.0	3 947.7	3 757.3	63.7
Total	**68 838**	**38 607**	**30 231**	**37 956.5**	**21 468.7**	**16 487.8**	**55.1**
2014/15	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	48 479	27 008	21 471	23 571.9	13 184.7	10 387.2	48.6
Technicians directly supporting R&D	12 183	7 688	4 495	7 731.3	4 867.9	2 863.4	63.5
Other personnel directly supporting R&D	11 738	5 915	5 823	7 161.9	3 833.0	3 328.9	61.0
Total	**72 400**	**40 611**	**31 789**	**38 465.0**	**21 885.6**	**16 579.5**	**53.1**

*Including doctoral and post-doctoral students.

Table C.30: R&D personnel in headcounts by sector (2005/06 to 2014/15)

YEAR	TOTAL R&D PERSONNEL (HEADCOUNTS)	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
2005/06	**57 275**	2 001	5 679	32 789	16 321	485
2006/07	**58 706**	2 924	5 798	32 033	17 467	484
2007/08	**59 344**	2 794	5 988	32 109	17 951	502
2008/09	**58 895**	2 963	5 609	31 226	18 595	502
2009/10	**59 494**	2 580	5 926	32 392	18 216	380
2010/11	**55 531**	2 704	4 923	32 571	14 933	400
2011/12	**59 487**	3 143	4 494	36 157	15 288	405
2012/13	**64 917**	3 252	5 399	38 205	17 155	906
2013/14	**68 838**	2 874	5 884	41 464	17 599	1 017
2014/15	**72 400**	2 893	4 836	44 457	18 743	1 471

*Note: Includes doctoral students and post-doctoral fellows at higher education institutes.

Table C.31: R&D personnel full-time equivalents by sector (2005/06 to 2014/15)

YEAR	TOTAL R&D PERSONNEL (FTEs)	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
2005/06	**28 798.2**	1 483.0	4 103.1	10 611.2	12 235.9	365.0
2006/07	**30 984.4**	2 068.3	4 956.1	11 002.0	12 595.3	362.7
2007/08	**31 354.4**	1 950.0	5 058.8	11 505.3	12 461.3	379.1
2008/09	**30 801.6**	2 073.9	4 699.9	11 169.0	12 492.5	366.4
2009/10	**30 891.3**	1 903.9	4 782.7	11 870.4	12 024.6	309.7
2010/11	**29 486.4**	2 178.6	4 312.4	12 477.3	10 205.1	313.1
2011/12	**30 978.4**	2 404.5	3 803.5	14 563.4	9 894.9	312.1
2012/13	**35 050.3**	2 597.0	4 748.5	15 614.4	11 322.3	768.0
2013/14	**37 956.5**	2 245.5	5 164.5	17 777.7	11 877.4	891.4
2014/15	**38 465.0**	2 181.5	4 180.4	17 944.4	12 927.5	1 231.2

*Note: Includes doctoral students and post-doctoral fellows at higher education institutes.

Table C.32: Researcher headcounts by sector (2005/06 to 2014/15)

YEAR	TOTAL RESEARCHERS (HEADCOUNTS)	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION*	BUSINESS	NOT-FOR-PROFIT
2005/06	**39 266**	874	1 790	28 879	7 480	243
2006/07	**39 591**	1 111	2 255	27 746	8 227	252
2007/08	**40 084**	1 138	2 594	27 752	8 336	264
2008/09	**39 955**	1 169	2 648	27 316	8 560	262
2009/10	**40 797**	986	2 669	28 552	8 366	224
2010/11	**37 901**	1 184	1 941	28 154	6 372	250
2011/12	**40 653**	1 411	1 803	30 993	6 192	254
2012/13	**42 828**	1 409	1 879	32 955	6 191	394
2013/14	**45 935**	1 229	1 956	36 133	6 182	435
2014/15	**48 479**	1 343	1 988	38 381	6 261	506

*Note: Includes doctoral students and post-doctoral fellows at higher education institutes.

Table C.33: Researcher headcounts by gender (2005/06 to 2014/15)

YEAR	TOTAL RESEARCHERS *(HEADCOUNTS)	MALE	FEMALE
2005/06	**29 264**	17 786	11 478
2006/07	**29 303**	17 913	11 390
2007/08	**29 327**	18 022	11 305
2008/09	**28 952**	17 694	11 258
2009/10	**29 255**	17 614	11 641
2010/11	**25 300**	14 823	10 477
2011/12	**25 954**	15 065	10 889
2012/13	**27 314**	15 378	11 936
2013/14	**28 014**	15 520	12 494
2014/15	**28 723**	15 824	12 899

*Excludes doctoral students and post-doctoral fellows.

Table C.34: Researcher headcounts by race (2005/06 to 2014/15)

YEAR	TOTAL RESEARCHERS *(HEADCOUNTS)	AFRICAN	COLOURED	INDIAN	WHITE
2005/06	**29 264**	6 087	1 329	2 220	19 628
2006/07	**29 303**	6 058	1 396	2 402	19 447
2007/08	**29 327**	6 566	1 398	2 434	18 929
2008/09	**28 952**	6 595	1 505	2 588	18 265
2009/10	**29 255**	7 210	1 573	2 448	18 024
2010/11	**25 300**	6 756	1 316	2 438	14 789
2011/12	**25 954**	7 201	1 438	2 202	15 113
2012/13	**27 314**	8 101	1 591	2 514	15 108
2013/14	**28 014**	8 024	1 685	2 530	15 775
2014/15	**28 723**	8 468	1 815	2 522	15 919

Note: Non-SA student data are not collected by population group.

*Excludes doctoral students and post-doctoral fellows

Table C.35: R&D personnel in headcounts (2014/15)

OCCUPATION AND QUALIFICATION	TOTAL R&D PERSONNEL (HEADCOUNTS)	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	**41 024**	**21 806**	**19 218**	**7 513**	**5 607**	**1 325**	**1 371**	**1 644**	**2 020**	**11 325**	**10 220**
*Doctoral degree or equivalent	21 936	11 809	10 128	4 131	2 715	766	701	821	1 074	6 090	5 638
Masters, honours, bachelor or equivalent	15 364	8 110	7 255	2 618	2 143	466	551	697	782	4 328	3 778
Diplomas	3 723	1 888	1 835	763	749	93	118	125	164	906	805
Technicians directly supporting R&D	**12 183**	**7 688**	**4 495**	**2 694**	**2 031**	**795**	**415**	**708**	**489**	**3 491**	**1 560**
Doctoral degree or equivalent	251	176	75	37	12	12	3	12	8	115	53
Masters, honours, bachelor or equivalent	5 698	3 337	2 361	1 047	898	213	195	398	319	1 679	949
Diplomas	6 233	4 175	2 059	1 610	1 121	569	217	297	162	1 698	558
Other personnel directly supporting R&D	**11 738**	**5 915**	**5 823**	**2 772**	**2 280**	**499**	**720**	**1 064**	**561**	**1 580**	**2 262**
Doctoral degree or equivalent	340	189	151	52	37	4	8	10	11	123	95
Masters, honours, bachelor or equivalent	2 549	984	1 565	311	498	59	127	72	108	544	832
Diplomas	8 849	4 742	4 107	2 410	1 745	436	585	982	443	913	1 335
Total	**64 945**	**35 409**	**29 536**	**12 979**	**9 919**	**2 618**	**2 505**	**3 416**	**3 070**	**16 395**	**14 042**

Note: Non-SA student data are not collected by population group.

*Doctoral degree or equivalent includes South African (that is it excludes non-SA) doctoral students and post-doctoral fellows.

C.2. Sector tables

C.2.1. Business sector

Table C.36: Business sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	721 255	800 085	929 134	1 073 117	1 267 759	1 025 389	922 888	802 753	968 504	845 527
Applied research	2 409 266	2 550 483	3 077 341	3 426 651	3 301 773	3 949 410	4 461 770	5 569 024	6 087 791	7 541 596
Experimental research	5 113 256	5 892 597	6 731 981	7 832 244	6 569 705	5 084 210	5 079 364	4 198 949	4 726 553	4 903 827
Total	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

Table C.37: Proportional business sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Basic research	8.7	8.7	8.7	8.7	11.4	10.2	8.8	7.6	8.2	6.4
Applied research	29.2	27.6	28.7	27.8	29.6	39.3	42.6	52.7	51.7	56.7
Experimental research	62.0	63.8	62.7	63.5	59.0	50.5	48.5	39.7	40.1	36.9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.38: Business sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	**1 446 650**	**1 120 589**	**1 445 305**	**2 658 738**	**1 638 994**	**1 306 444**	**1 650 541**	**1 072 556**	**1 132 520**	**1 397 243**
Land: buildings and other structures	199 088	154 129	262 994	207 473	285 285	202 835	217 126	140 053	159 162	117 656
Vehicles, plant, machinery, equipment	1 247 562	966 460	1 182 311	2 451 265	1 353 709	1 103 609	1 433 415	932 503	973 358	1 279 587
Current expenditure	**6 797 126**	**8 122 576**	**9 293 151**	**9 673 274**	**9 500 243**	**8 752 566**	**8 813 481**	**9 498 170**	**10 650 328**	**11 893 708**
Labour costs	3 703 277	4 461 218	4 881 074	5 279 507	5 207 695	4 467 214	4 723 488	5 821 884	6 768 527	7 659 365
Other current expenditure	3 093 849	3 661 358	4 412 077	4 393 767	4 292 548	4 285 352	4 089 993	3 676 286	3 881 801	4 234 343
Total	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

Table C.39: Proportional business sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	**17.5**	**12.1**	**13.5**	**21.6**	**14.7**	**13.0**	**15.8**	**10.1**	**9.6**	**10.5**
Land: buildings and other structures	2.4	1.7	2.4	1.7	2.6	2.0	2.1	1.3	1.4	0.9
Vehicles, plant, machinery, equipment	15.1	10.5	11.0	19.9	12.2	11.0	13.7	8.8	8.3	9.6
Current expenditure	**82.5**	**87.9**	**86.5**	**78.4**	**85.3**	**87.0**	**84.2**	**89.9**	**90.4**	**89.5**
Labour costs	44.9	48.3	45.5	42.8	46.8	44.4	45.1	55.1	57.4	57.6
Other current expenditure	37.5	39.6	41.1	35.6	38.5	42.6	39.1	34.8	32.9	31.9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.40: Business sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	138 407	132 641	169 410	268 923	330 232	341 695	422 121	499 589	556 275	578 747
Nanotechnology	140 187	155 049	30 314	56 881	150 474	102 670	171 808	225 557	170 479	217 216
Total	**278 595**	**287 690**	**199 724**	**325 804**	**480 706**	**444 366**	**593 929**	**725 145**	**726 754**	**795 963**
Business expenditure on R&D	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

Table C.41: Proportional business sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Biotechnology	1.7	1.4	1.6	2.2	3.0	3.4	4.0	4.7	4.7	4.4
Nanotechnology	1.7	1.7	0.3	0.5	1.4	1.0	1.6	2.1	1.4	1.6
Total	**3.4**	**3.1**	**1.9**	**2.6**	**4.3**	**4.4**	**5.7**	**6.9**	**6.2**	**6.0**

Table C.42: Business sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	31 349	183 921	228 905	176 463
Open source software	60 476	118 858	114 195	96 266	91 818	68 105	85 787	87 200	233 576	241 710
New materials	160 859	115 339	72 992	154 140	173 308	227 682	277 152	225 897	151 890	245 752
Tuberculosis (TB), HIV/ AIDS, malaria	274 236	294 689	302 122	466 161	460 233	631 996	812 580	929 121	992 538	1 082 646
Total	**495 571**	**528 886**	**489 309**	**716 567**	**725 359**	**927 783**	**1 206 869**	**1 426 139**	**1 606 909**	**1 746 571**
Business expenditure on R&D	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.43: Proportional business sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	0.3	1.7	1.9	1.3
Open source software	0.7	1.3	1.1	0.8	0.8	0.7	0.8	0.8	2.0	1.8
New materials	2.0	1.2	0.7	1.2	1.6	2.3	2.6	2.1	1.3	1.8
Tuberculosis (TB), HIV/ AIDS, malaria	3.3	3.2	2.8	3.8	4.1	6.3	7.8	8.8	8.4	8.1
Total	**6.0**	**5.7**	**4.6**	**5.8**	**6.5**	**9.2**	**11.5**	**13.5**	**13.6**	**13.1**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.44: Business sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**7 919 744**	**8 881 904**	**10 357 433**	**11 902 551**	**10 743 523**	**9 612 221**	**9 992 916**	**9 127 446**	**9 765 859**	**10 977 250**
Mathematical sciences	169 355	159 496	176 077	183 255	183 426	110 543	204 594	149 220	209 344	211 324
Physical sciences	312 246	382 551	507 646	655 898	190 292	32 669	28 489	47 672	50 708	56 997
Chemical sciences	441 138	438 969	580 146	859 041	627 729	687 843	934 005	980 021	979 760	847 321
Earth sciences	52 781	66 244	93 014	95 034	90 098	106 759	92 439	102 892	109 665	118 539
Information, computer and communication technologies	1 635 321	1 980 630	2 182 253	2 412 430	2 855 355	2 502 454	2 481 028	1 576 163	1 610 718	1 908 985
Applied sciences and technologies	1 384 945	1 551 885	1 581 438	1 671 375	1 271 414	1 132 538	902 425	872 014	808 899	955 119
Engineering sciences	2 219 530	2 439 092	3 237 265	3 908 347	3 311 902	2 768 035	2 751 145	2 827 677	3 093 088	3 548 019
Biological sciences	163 796	160 584	161 058	162 776	194 671	207 456	212 632	210 627	213 124	248 838
Agricultural sciences	257 447	277 889	311 287	293 357	323 603	371 310	471 529	444 593	593 315	665 703
Medical and health sciences	1 073 854	1 225 114	1 268 551	1 509 109	1 567 493	1 622 215	1 843 005	1 812 411	1 974 213	2 170 317
Environmental sciences	52 492	42 315	62 355	57 764	47 692	5 818	2 206	44 563	50 909	85 932
Material sciences	146 886	146 588	184 625	82 192	70 949	59 723	65 092	53 855	64 090	154 500
Marine sciences	9 951	10 547	11 719	11 975	8 899	4 859	4 324	5 738	8 026	5 655
Division 2: Social Sciences and Humanities	**324 032**	**361 261**	**381 023**	**429 461**	**395 714**	**446 789**	**471 106**	**1 443 280**	**2 016 989**	**2 313 701**
Social sciences	323 673	360 856	380 554	428 969	395 115	446 789	471 106	1 443 280	2 016 989	2 313 701
Humanities	359	405	469	491	599	0	0	0	0	
Total	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

Table C.45: Proportional business sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**96.1**	**96.1**	**96.5**	**96.5**	**96.4**	**95.6**	**95.5**	**86.3**	**82.9**	**82.6**
Mathematical sciences	2.1	1.7	1.6	1.5	1.6	1.1	2.0	1.4	1.8	1.6
Physical sciences	3.8	4.1	4.7	5.3	1.7	0.3	0.3	0.5	0.4	0.4
Chemical sciences	5.4	4.7	5.4	7.0	5.6	6.8	8.9	9.3	8.3	6.4
Earth sciences	0.6	0.7	0.9	0.8	0.8	1.1	0.9	1.0	0.9	0.9
Information, computer and communication technologies	19.8	21.4	20.3	19.6	25.6	24.9	23.7	14.9	13.7	14.4
Applied sciences and technologies	16.8	16.8	14.7	13.6	11.4	11.3	8.6	8.2	6.9	7.2
Engineering sciences	26.9	26.4	30.1	31.7	29.7	27.5	26.3	26.8	26.3	26.7
Biological sciences	2.0	1.7	1.5	1.3	1.7	2.1	2.0	2.0	1.8	1.9
Agricultural sciences	3.1	3.0	2.9	2.4	2.9	3.7	4.5	4.2	5.0	5.0
Medical and health sciences	13.0	13.3	11.8	12.2	14.1	16.1	17.6	17.1	16.8	16.3
Environmental sciences	0.6	0.5	0.6	0.5	0.4	0.1	0.0	0.4	0.4	0.6
Material sciences	1.8	1.6	1.7	0.7	0.6	0.6	0.6	0.5	0.5	1.2
Marine sciences	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0
Division 2: Social Sciences and Humanities	**3.9**	**3.9**	**3.5**	**3.5**	**3.6**	**4.4**	**4.5**	**13.7**	**17.1**	**17.4**
Social sciences	3.9	3.9	3.5	3.5	3.5	4.4	4.5	13.7	17.1	17.4
Humanities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.46: Business sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**747 523**	**777 139**	**900 909**	**908 781**	**959 761**	**1 103 510**	**813 259**	**1 040 025**	**1 096 986**	**1 034 893**
Defence	747 523	777 139	900 909	908 781	959 761	1 103 510	813 259	1 040 025	1 096 986	1 034 893
Division 2: Economic Development	**6 384 780**	**7 233 003**	**8 399 187**	**9 737 338**	**8 258 491**	**7 012 272**	**7 381 289**	**7 234 533**	**8 308 177**	**9 663 402**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant production and plant primary products	273 503	279 937	279 437	266 259	309 370	288 323	315 806	374 327	454 990	593 610
Animal production and animal primary products	61 266	67 619	78 657	74 302	110 295	46 709	46 316	38 484	69 916	74 045
Mineral resources (excluding Energy)	829 414	779 765	937 628	839 558	741 401	728 130	733 280	853 544	977 365	1 405 074
Energy resources	385 851	470 735	585 453	732 188	290 662	93 532	90 377	90 975	95 375	100 061
Energy supply	205 657	239 018	252 064	393 798	426 407	470 030	490 490	321 456	349 710	503 222
Manufacturing	1 603 753	1 846 199	2 117 823	2 562 745	2 037 129	1 747 369	1 863 289	1 639 077	1 869 926	2 096 271
Construction	631 698	756 166	1 017 969	1 295 717	367 510	16 284	46 158	96 071	125 059	138 237
Transport	391 173	446 162	523 022	621 479	843 301	872 149	920 081	951 435	1 080 427	935 483
Information and communication services	818 485	895 714	1 087 198	1 151 637	1 189 650	851 392	978 187	908 640	842 341	1 097 649
Commercial services	1 091 434	1 329 972	1 347 470	1 422 123	1 747 450	1 773 253	1 739 933	1 755 506	2 255 642	2 555 783
Economic framework	13 515	16 243	41 756	160 562	106 693	70 795	57 474	103 240	91 464	79 065
Natural resources	79 032	105 475	130 711	216 971	88 624	54 306	99 898	101 778	95 962	84 901
Division 3: Society	**798 247**	**839 908**	**915 567**	**1 019 848**	**1 224 481**	**1 041 616**	**1 232 867**	**1 242 066**	**1 303 321**	**1 435 870**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	761 222	799 201	857 364	930 645	1 103 816	880 549	1 054 182	1 045 048	1 097 446	1 212 844
Education and training	11 199	12 913	12 204	27 232	26 444	32 486	32 767	29 566	33 913	35 728
Social development and community services	25 827	27 794	45 999	61 971	94 220	128 581	145 918	167 452	171 962	187 298
Division 4: Environment	**109 803**	**113 821**	**164 552**	**221 747**	**211 208**	**211 025**	**220 698**	**173 535**	**171 747**	**219 212**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental knowledge	33 395	39 233	62 551	91 953	53 022	51 845	58 565	46 213	43 935	55 885
Environmental aspects of development	28 781	28 327	33 901	31 493	22 456	55 577	42 226	17 957	14 344	38 437
Environmental and other aspects	47 626	46 261	68 100	98 301	135 730	103 602	119 907	109 365	113 468	124 889
Division 5: Advancement of Knowledge	**203 423**	**279 295**	**358 242**	**444 298**	**485 296**	**690 587**	**815 909**	**880 567**	**902 617**	**937 575**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural sciences, technologies and engineering	200 018	275 446	353 694	439 330	479 999	682 401	813 150	877 557	899 840	932 030
Social sciences and humanities	3 406	3 848	4 548	4 968	5 298	8 186	2 758	3 010	2 776	5 545
Total	**8 243 776**	**9 243 165**	**10 738 457**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

Table C.47: Proportional business sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**9.1**	**8.4**	**8.4**	**7.4**	**8.6**	**11.0**	**7.8**	**9.8**	**9.3**	**7.8**
Defence	9.1	8.4	8.4	7.4	8.6	11.0	7.8	9.8	9.3	7.8
Division 2: Economic Development	**77.4**	**78.3**	**78.2**	**79.0**	**74.1**	**69.7**	**70.5**	**68.4**	**70.5**	**72.7**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	3.3	3.0	2.6	2.2	2.8	2.9	3.0	3.5	3.9	4.5
Animal production and animal primary products	0.7	0.7	0.7	0.6	1.0	0.5	0.4	0.4	0.6	0.6
Mineral resources (excluding Energy)	10.1	8.4	8.7	6.8	6.7	7.2	7.0	8.1	8.3	10.6
Energy resources	4.7	5.1	5.5	5.9	2.6	0.9	0.9	0.9	0.8	0.8
Energy supply	2.5	2.6	2.3	3.2	3.8	4.7	4.7	3.0	3.0	3.8
Manufacturing	19.5	20.0	19.7	20.8	18.3	17.4	17.8	15.5	15.9	15.8
Construction	7.7	8.2	9.5	10.5	3.3	0.2	0.4	0.9	1.1	1.0
Transport	4.7	4.8	4.9	5.0	7.6	8.7	8.8	9.0	9.2	7.0
Information and communication services	9.9	9.7	10.1	9.3	10.7	8.5	9.3	8.6	7.1	8.3
Commercial services	13.2	14.4	12.5	11.5	15.7	17.6	16.6	16.6	19.1	19.2
Economic framework	0.2	0.2	0.4	1.3	1.0	0.7	0.5	1.0	0.8	0.6
Natural resources	1.0	1.1	1.2	1.8	0.8	0.5	1.0	1.0	0.8	0.6
Division 3: Society	**9.7**	**9.1**	**8.5**	**8.3**	**11.0**	**10.4**	**11.8**	**11.8**	**11.1**	**10.8**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	9.2	8.6	8.0	7.5	9.9	8.8	10.1	9.9	9.3	9.1
Education and training	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Social development and community services	0.3	0.3	0.4	0.5	0.8	1.3	1.4	1.6	1.5	1.4
Division 4: Environment	**1.3**	**1.2**	**1.5**	**1.8**	**1.9**	**2.1**	**2.1**	**1.6**	**1.5**	**1.6**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	0.4	0.4	0.6	0.7	0.5	0.5	0.6	0.4	0.4	0.4
Environmental aspects of development	0.3	0.3	0.3	0.3	0.2	0.6	0.4	0.2	0.1	0.3
Environmental and other aspects	0.6	0.5	0.6	0.8	1.2	1.0	1.1	1.0	1.0	0.9
Division 5: Advancement of Knowledge	**2.5**	**3.0**	**3.3**	**3.6**	**4.4**	**6.9**	**7.8**	**8.3**	**7.7**	**7.1**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	2.4	3.0	3.3	3.6	4.3	6.8	7.8	8.3	7.6	7.0
Social sciences and humanities	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.48: Business sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	242 692	247 295	283 488	316 089	320 955	217 880	354 553	468 197	646 497	608 398
Free State	476 346	665 443	786 225	1 213 808	999 554	943 508	1 308 833	1 265 285	1 374 960	831 575
Gauteng	4 643 864	5 263 546	6 142 233	7 131 411	6 120 062	5 439 718	5 558 409	5 356 550	5 813 673	7 160 280
KwaZulu-Natal	843 499	962 308	1 302 260	1 255 509	1 183 636	1 280 014	1 160 507	1 237 563	1 434 084	1 501 659
Limpopo	84 187	72 813	71 687	75 675	49 375	41 850	62 728	127 451	140 026	161 331
Mpumalanga	187 934	172 948	196 368	201 550	161 154	139 771	157 158	222 974	301 831	435 770
North-West	180 227	197 383	193 339	222 630	267 528	256 428	302 164	380 144	435 849	681 634
Northern Cape	14 691	15 834	7 450	7 319	7 988	17 017	45 267	78 471	124 150	226 303
Western Cape	1 570 336	1 645 595	1 755 404	1 908 020	2 028 984	1 722 823	1 514 404	1 434 090	1 511 778	1 684 001
Total	**8 243 776**	**9 243 165**	**10 738 456**	**12 332 012**	**11 139 237**	**10 059 010**	**10 464 022**	**10 570 726**	**11 782 848**	**13 290 951**

Table C.49: Proportional business sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	2.9	2.7	2.6	2.6	2.9	2.2	3.4	4.4	5.5	4.6
Free State	5.8	7.2	7.3	9.8	9.0	9.4	12.5	12.0	11.7	6.3
Gauteng	56.3	56.9	57.2	57.8	54.9	54.1	53.1	50.7	49.3	53.9
KwaZulu-Natal	10.2	10.4	12.1	10.2	10.6	12.7	11.1	11.7	12.2	11.3
Limpopo	1.0	0.8	0.7	0.6	0.4	0.4	0.6	1.2	1.2	1.2
Mpumalanga	2.3	1.9	1.8	1.6	1.4	1.4	1.5	2.1	2.6	3.3
North-West	2.2	2.1	1.8	1.8	2.4	2.5	2.9	3.6	3.7	5.1
Northern Cape	0.2	0.2	0.1	0.1	0.1	0.2	0.4	0.7	1.1	1.7
Western Cape	19.0	17.8	16.3	15.5	18.2	17.1	14.5	13.6	12.8	12.7
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.50: Business sector R&D expenditure by Standard Industrial Classification Code (SIC) (2005/06 to 2014/15)

STANDARD INDUSTRIAL CLASSIFICATION	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Agriculture, Hunting, Forestry and Fishing	**206 449**	**199 959**	**213 808**	**220 757**	**208 447**	**157 916**	**211 132**	**286 832**	**364 424**	**460 464**
Mining and Quarrying	**428 066**	**518 262**	**559 332**	**578 825**	**499 286**	**1 055 963**	**1 352 877**	**1 554 284**	**1 675 153**	**1 340 103**
Manufacturing	**3 367 640**	**3 537 433**	**4 222 127**	**4 787 581**	**4 321 327**	**3 592 204**	**3 551 234**	**3 476 647**	**3 793 066**	**4 501 146**
Manufacture of Food Products, Beverages and Tobacco Products	194 900	183 391	196 238	215 876	162 851	221 370	283 262	319 143	340 427	364 178
Manufacture of Textiles, Clothing and Leather Goods	23 047	21 899	17 888	13 755	16 946	2 437	0	2 073	32 091	34 609
Manufacture of Wood and Products of Wood and Cork, except furniture; Manufacture of Articles of Straw and Plaiting Materials; Manufacture of Paper and Paper Products; Manufacture of Publishing, Printing and Reproduction of Recorded Material	102 715	110 631	118 535	118 016	111 255	106 448	80 255	50 531	60 437	72 870
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	1 057 218	1 301 947	1 579 382	2 267 063	1 758 353	1 197 179	1 381 001	1 139 617	1 256 313	1 835 837
Manufacture of Non-Metallic Mineral Products	108 310	127 714	183 758	134 638	120 508	87 037	72 039	49 974	52 263	51 097
Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment; Manufacture of Office, Accounting and Computing Machinery	600 305	386 605	500 715	315 295	330 137	240 408	392 800	585 635	620 923	607 574
Manufacture of Electrical Machinery and Apparatus	157 388	189 554	187 612	166 498	146 169	207 954	310 599	312 102	254 042	302 575
Manufacture of Radio, Television and Communication Equipment & Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches & Clocks	378 170	425 585	506 497	511 356	591 774	590 174	639 217	656 639	742 033	706 308
Manufacture of Transport Equipment	726 605	784 209	924 053	984 235	1 022 589	881 958	310 145	267 788	334 276	408 448
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	18 983	5 898	7 449	60 849	60 743	57 240	81 914	93 145	100 261	117 649
Electricity, Gas and Water Supply	**1 067 428**	**1 292 925**	**1 737 511**	**2 306 297**	**955 690**	**536 050**	**494 745**	**385 770**	**355 720**	**548 015**
Construction	**8 815**	**4 559**	**6 043**	**6 105**	**3 490**	**3 213**	**6 495**	**9 051**	**8 037**	**6 637**
Wholesale and Retail	**274 743**	**324 666**	**317 780**	**334 131**	**434 522**	**620 541**	**547 194**	**179 383**	**100 176**	**85 491**
Transport, Storage and Communication	**438 003**	**453 715**	**490 138**	**425 235**	**415 243**	**354 311**	**484 222**	**467 411**	**451 336**	**632 243**
Financial Intermediation, Real Estate and Business Services	**2 080 840**	**2 477 423**	**2 759 550**	**3 377 896**	**3 777 124**	**3 326 985**	**3 645 625**	**3 914 543**	**4 724 439**	**5 357 151**
Community, Social and Personal Services	**371 792**	**434 223**	**432 167**	**295 185**	**524 108**	**411 826**	**170 499**	**296 805**	**310 498**	**359 701**
Total	8 243 776	9 243 165	10 738 456	12 332 012	11 139 237	10 059 010	10 464 022	10 570 726	11 782 848	13 290 951

Table C.51: Proportional business sector R&D expenditure by Standard Industrial Classification Code (SIC) (2005/06 to 2014/15)

STANDARD INDUSTRIAL CLASSIFICATION	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Agriculture, Hunting, Forestry and Fishing	**2.5**	**2.2**	**2.0**	**1.8**	**1.9**	**1.6**	**2.0**	**2.7**	**3.1**	**3.5**
Mining and Quarrying	**5.2**	**5.6**	**5.2**	**4.7**	**4.5**	**10.5**	**12.9**	**14.7**	**14.2**	**10.1**
Manufacturing	**40.9**	**38.3**	**39.3**	**38.8**	**38.8**	**35.7**	**33.9**	**32.9**	**32.2**	**33.9**
Manufacture of Food Products, Beverages and Tobacco Products	2.4	2.0	1.8	1.8	1.5	2.2	2.7	3.0	2.9	2.7
Manufacture of Textiles, Clothing and Leather Goods	0.3	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.3	0.3
Manufacture of Wood and Products of Wood and Cork, except furniture; Manufacture of Articles of Straw and Plaiting Materials; Manufacture of Paper and Paper Products; Manufacture of Publishing, Printing and Reproduction of Recorded Material	1.2	1.2	1.1	1.0	1.0	1.1	0.8	0.5	0.5	0.5
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	12.8	14.1	14.7	18.4	15.8	11.9	13.2	10.8	10.7	13.8
Manufacture of Non-Metallic Mineral Products	1.3	1.4	1.7	1.1	1.1	0.9	0.7	0.5	0.4	0.4
Manufacture of Basic Metals, Fabricated Metal Products, Machinery & Equipment; Manufacture of Office, Accounting and Computing Machinery	7.3	4.2	4.7	2.6	3.0	2.4	3.8	5.5	5.3	4.6
Manufacture of Electrical Machinery and Apparatus	1.9	2.1	1.7	1.4	1.3	2.1	3.0	3.0	2.2	2.3
Manufacture of Radio, Television and Communication Equipment &Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches & Clocks	4.6	4.6	4.7	4.1	5.3	5.9	6.1	6.2	6.3	5.3
Manufacture of Transport Equipment	8.8	8.5	8.6	8.0	9.2	8.8	3.0	2.5	2.8	3.1
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	0.2	0.1	0.1	0.5	0.5	0.6	0.8	0.9	0.9	0.9
Electricity, Gas and Water Supply	**12.9**	**14.0**	**16.2**	**18.7**	**8.6**	**5.3**	**4.7**	**3.6**	**3.0**	**4.1**
Construction	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.1**	**0.0**
Wholesale and Retail	**3.3**	**3.5**	**3.0**	**2.7**	**3.9**	**6.2**	**5.2**	**1.7**	**0.9**	**0.6**
Transport, Storage and Communication	**5.3**	**4.9**	**4.6**	**3.4**	**3.7**	**3.5**	**4.6**	**4.4**	**3.8**	**4.8**
Financial Intermediation, Real Estate and Business Services	**25.2**	**26.8**	**25.7**	**27.4**	**33.9**	**33.1**	**34.8**	**37.0**	**40.1**	**40.3**
Community, Social and Personal Services	**4.5**	**4.7**	**4.0**	**2.4**	**4.7**	**4.1**	**1.6**	**2.8**	**2.6**	**2.7**
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.52: Business sector R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2005/06	**16 321**	7 480	4 143	4 698	**12 235.9**	5 895.7	3 050.0	3 290.1
2006/07	**17 467**	8 227	5 113	4 127	**12 595.3**	6 110.9	3 735.0	2 749.4
2007/08	**17 951**	8 336	5 303	4 312	**12 461.3**	6 047.5	3 796.4	2 617.4
2008/09	**18 595**	8 560	5 584	4 451	**12 492.5**	6 172.0	3 809.9	2 510.6
2009/10	**18 216**	8 366	5 362	4 488	**12 024.6**	6 059.5	3 612.6	2 352.6
2010/11	**14 933**	6 372	4 630	3 931	**10 205.1**	4 804.0	3 318.7	2 082.3
2011/12	**15 288**	6 192	5 095	4 001	**9 894.9**	4 451.9	3 343.5	2 099.5
2012/13	**17 155**	6 191	6 394	4 570	**11 322.3**	4 555.9	4 065.5	2 700.9
2013/14	**17 599**	6 182	6 397	5 020	**11 877.4**	4 530.1	4 253.1	3 094.2
2014/15	**18 743**	6 261	6 912	5 570	**12 927.5**	4 636.2	4 494.4	3 796.9

Table C.53: Business sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	6 191	4 013	2 178	4 556	2 843	1 712	73.6
Technicians directly supporting R&D	6 394	4 370	2 024	4 065	2 738	1 328	63.6
Other personnel directly supporting R&D	4 570	2 556	2 014	2 701	1 578	1 123	59.1
Total	**17 155**	**10 939**	**6 216**	**11 322**	**7 159**	**4 163**	**66.0**
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	6 182	3 895	2 287	4 530	2 749	1 781	73.3
Technicians directly supporting R&D	6 397	4 418	1 979	4 253	2 876	1 377	66.5
Other personnel directly supporting R&D	5 020	2 879	2 141	3 094	1 817	1 277	61.6
Total	**17 599**	**11 192**	**6 407**	**11 877**	**7 443**	**4 435**	**67.5**
2014/15	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	6 261	3 945	2 316	4 636	2 799	1 837	74.0
Technicians directly supporting R&D	6 912	4 816	2 096	4 494	3 088	1 406	65.0
Other personnel directly supporting R&D	5 570	3 328	2 242	3 797	2 352	1 444	68.2
Total	**18 743**	**12 089**	**6 654**	**12 928**	**8 240**	**4 688**	**69.0**

Table C.54: Business sector R&D personnel in headcounts by occupation, qualification, population group and gender (2014/15)

OCCUPATION AND QUALIFICATION	TOTAL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	**6 261**	**3 945**	**2 316**	**519**	**501**	**169**	**143**	**311**	**269**	**2 947**	**1 403**
Doctoral degree or equivalent	628	433	196	69	22	14	18	14	22	335	134
Masters, honours, bachelor or equivalent	4 419	2 821	1 599	332	327	112	73	233	188	2 143	1 010
Diplomas	1 213	692	521	117	152	43	51	63	59	468	260
Technicians directly supporting R&D	**6 912**	**4 816**	**2 096**	**1 389**	**804**	**413**	**190**	**528**	**260**	**2 486**	**842**
Doctoral degree or equivalent	56	41	15	6	3	4	0	7	2	24	11
Masters, honours, bachelor or equivalent	3 503	2 222	1 281	531	407	128	86	308	198	1 255	590
Diplomas	3 352	2 553	800	852	394	280	104	212	60	1 208	241
Other personnel directly supporting R&D	**5 570**	**3 328**	**2 242**	**1 241**	**775**	**163**	**174**	**966**	**396**	**958**	**897**
Doctoral degree or equivalent	41	24	17	3	3	0	0	1	2	20	12
Masters, honours, bachelor or equivalent	734	336	398	23	79	8	5	24	29	283	285
Diplomas	4 795	2 968	1 827	1 216	693	155	169	941	366	655	600
Total	**18 743**	**12 089**	**6 654**	**3 149**	**2 081**	**744**	**506**	**1 805**	**925**	**6 390**	**3 142**

Table C.55: Number of foreign and local business sector partners engaged in collaborative R&D, and total R&D collaboration expenditure (2012/13, 2013/14 and 2014/15)

	2012/13		2013/14		2014/15	
COLLABORATION PARTNERS	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA	WITHIN SOUTH AFRICA	OUTSIDE SOUTH AFRICA
Government research institutes	19	10	22	8	14	10
Higher education institutions	63	19	69	16	66	19
Members of own company	27	8	28	11	25	8
Not-for-profit organisations	5	4	6	0	6	3
Other companies	55	34	48	26	56	30
Science councils	42	7	43	6	44	9
Total number of R&D collaborations	**211**	**82**	**216**	**67**	**211**	**79**
No collaboration	45	44	N/A	N/A	20	21
R&D EXPENDITURE	**R'000**	**R'000**	**R'000**	**R'000**	**R'000**	**R'000**
Total in-house plus outsourced R&D collaboration expenditure (excl. VAT)	**2 688 798**	**288 917**	**3 445 916**	**670 854**	**2 653 929**	**1 357 157**

Note: Collaborative R&D entails partnerships, alliances and collaborations.

Business sector: State Owned Enterprises

Table C.56: Business sector: SOEs – Number, R&D Expenditure, and R&D Expenditure as a proportion of BERD (2005/06 To 2014/15)

YEAR	NUMBER OF R&D PERFORMERS	R&D EXPENDITURE	PROPORTION OF BERD
		R'000	%
2005/06	19	1 015 118	12.3
2006/07	19	1 116 345	12.1
2007/08	19	1 308 424	12.2
2008/09	21	1 509 078	12.2
2009/10	20	1 612 166	14.5
2010/11	18	1 592 803	15.8
2011/12	19	1 320 492	12.6
2012/13	20	1 499 121	14.2
2013/14	18	1 596 371	13.5
2014/15	18	2 005 525	15.1

* The average number of state owned enterprises active within a reference period in the survey from 2005/06 to 2014/15 was 19.

Table C.57: Business sector: SOEs – R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	51 470	58 708	60 660	73 001	85 012	68 748	55 507	57 897	262 183	64 049
Applied research	411 713	462 578	621 961	739 003	748 804	808 496	833 105	796 076	631 978	1 206 877
Experimental research	551 935	595 059	625 803	697 073	778 349	715 560	431 880	645 148	702 210	734 598
Total	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

Table C.58: Business sector: SOEs – Proportional R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Basic research	5.1	5.3	4.6	4.8	5.3	4.3	4.2	3.9	16.4	3.2
Applied research	40.6	41.4	47.5	49.0	46.4	50.8	63.1	53.1	39.6	60.2
Experimental research	54.4	53.3	47.8	46.2	48.3	44.9	32.7	43.0	44.0	36.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table C.59: Business sector: SOEs – R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	**83 327**	**89 780**	**184 052**	**348 129**	**376 012**	**381 236**	**333 325**	**177 959**	**243 577**	**354 114**
Land: buildings and other structures	12 311	12 318	107 001	37 534	35 489	19 893	14 032	10 195	12 420	15 770
Vehicles, plant, machinery, equipment	71 016	77 462	77 051	310 595	340 523	361 343	319 293	167 764	231 157	338 344
Current expenditure	**931 791**	**1 026 565**	**1 124 372**	**1 160 949**	**1 236 154**	**1 211 567**	**987 167**	**1 321 162**	**1 352 794**	**1 651 411**
Labour costs	568 780	632 428	640 347	668 495	711 991	663 491	659 509	790 514	842 471	914 909
Other current expenditure	363 011	394 137	484 025	492 454	524 163	548 076	327 658	530 648	510 323	736 502
Total	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

Table C.60: Business sector: SOEs – Proportional R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	8.2	8.0	14.1	23.1	23.3	23.9	25.2	11.9	15.3	17.7
Land: buildings and other structures	1.2	1.1	8.2	2.5	2.2	1.2	1.1	0.7	0.8	0.8
Vehicles, plant, machinery, equipment	7.0	6.9	5.9	20.6	21.1	22.7	24.2	11.2	14.5	16.9
Current expenditure	91.8	92.0	85.9	76.9	76.7	76.1	74.8	88.1	84.7	82.3
Labour costs	56.0	56.7	48.9	44.3	44.2	41.7	49.9	52.7	52.8	45.6
Other current expenditure	35.8	35.3	37.0	32.6	32.5	34.4	24.8	35.4	32.0	36.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table C.61: Business sector: SOEs – expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	9 038	7 853	11 729	11 236	6 834	15 100	14 615	20 899	19 165	13 712
Nanotechnology	5 174	5 565	1 993	1 045	2 553	2 995	7 103	3 768	654	700
Total	14 212	13 417	13 722	12 281	9 386	18 095	21 717	24 667	19 819	14 411
Business expenditure on R&D	1 015 118	1 116 345	1 308 424	1 509 078	1 612 166	1 592 803	1 320 492	1 499 121	1 596 371	2 005 525

Table C.62: Business sector: SOEs – Proportional expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Biotechnology	0.9	0.7	0.9	0.7	0.4	0.9	1.1	1.4	1.2	0.7
Nanotechnology	0.5	0.5	0.2	0.1	0.2	0.2	0.5	0.3	0.0	0.0
Total	1.4	1.2	1.0	0.8	0.6	1.1	1.6	1.6	1.2	0.7

N/A: Environment related data was collected from the 2011/12 R&D survey onward.

Table C.63: Business sector: SOEs – R&D expenditure on selective areas of interest (2005/06 to 2014/15)

AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	NA	NA	NA	NA	NA	NA	12 029	12 704	19 098	47 924
Open source software	2 254	3 104	2 566	3 190	5 597	9 087	8 736	7 599	4 124	0
New materials	13 445	4 835	2 919	6 673	17 054	14 598	14 872	12 082	12 233	11 111
Tuberculosis (TB), HIV/ AIDS, malaria	0	0	0	0	0	0	0	0	0	0
Total	**15 700**	**7 939**	**5 484**	**9 863**	**22 652**	**23 684**	**35 636**	**32 385**	**35 456**	**59 035**
Business expenditure on R&D	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

N/A: Environment related data was collected from the 2011/12 R&D survey onward.

Table C.64: Business sector: SOEs – Proportional R&D expenditure on selective areas of interest (2005/06 to 2014/15)

AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Environment related	NA	NA	NA	NA	NA	NA	0.9	0.8	1.2	2.4
Open source software	0.2	0.3	0.2	0.2	0.3	0.6	0.7	0.5	0.3	0.0
New materials	1.3	0.4	0.2	0.4	1.1	0.9	1.1	0.8	0.8	0.6
Tuberculosis (TB), HIV/ AIDS, malaria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**1.5**	**0.7**	**0.4**	**0.7**	**1.4**	**1.5**	**2.7**	**2.2**	**2.2**	**2.9**

N/A: Environment related data was collected from the 2011/12 R&D survey onward.

Table C.65: Business sector: SOEs – R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**1 006 036**	**1 106 083**	**1 296 669**	**1 496 556**	**1 598 965**	**1 578 152**	**1 320 492**	**1 499 121**	**1 596 371**	**1 949 385**
Mathematical sciences	20 639	25 561	29 281	30 037	34 896	38 311	142 930	86 576	93 820	137 076
Physical sciences	15 125	19 493	18 327	21 250	22 023	20 826	14 992	40 742	44 460	46 559
Chemical sciences	58 991	63 739	71 947	58 062	57 109	66 503	80 556	133 867	132 399	86 408
Earth sciences	20 878	19 500	22 338	23 703	25 151	27 912	0	44 006	48 671	24 356
Information, computer and communication technologies	50 719	55 969	62 425	92 189	88 484	64 163	126 456	155 601	168 174	304 806
Applied sciences and technologies	500 099	564 141	417 888	414 605	463 629	493 071	153 475	176 600	176 391	165 214
Engineering sciences	293 563	306 417	617 619	803 294	849 867	834 606	768 675	781 073	824 057	1 034 900
Biological sciences	2 198	2 484	4 020	2 889	2 727	0	0	4 466	21 321	19 107
Agricultural sciences	3 120	3 526	3 194	863	719	6 816	8 137	1 473	7 691	8 189
Medical and health sciences	3 120	3 526	0	0	0	15 614	17 491	18 012	18 316	49 357
Environmental sciences	29 221	33 019	37 822	37 982	41 092	3 052	0	42 440	45 772	59 270
Material sciences	4 721	4 591	7 092	6 967	8 296	7 279	7 780	8 605	9 198	9 849
Marine sciences	3 644	4 118	4 716	4 716	4 972	0	0	5 659	6 103	4 294
Division 2: Social Sciences and Humanities	**9 082**	**10 262**	**11 755**	**12 522**	**13 201**	**14 651**	**0**	**0**	**0**	**56 140**
Social sciences	9 082	10 262	11 755	12 522	13 201	14 651	0	0	0	56 140
Humanities	0	0	0	0	0	0	0	0	0	0
Total	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

Table C.66: Business sector: SOEs – Proportional R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**99.1**	**99.1**	**99.1**	**99.2**	**99.2**	**99.1**	**100.0**	**100.0**	**100.0**	**97.2**
Mathematical sciences	2.0	2.3	2.2	2.0	2.2	2.4	10.8	5.8	5.9	6.8
Physical sciences	1.5	1.7	1.4	1.4	1.4	1.3	1.1	2.7	2.8	2.3
Chemical sciences	5.8	5.7	5.5	3.8	3.5	4.2	6.1	8.9	8.3	4.3
Earth sciences	2.1	1.7	1.7	1.6	1.6	1.8	0.0	2.9	3.0	1.2
Information, computer and communication technologies	5.0	5.0	4.8	6.1	5.5	4.0	9.6	10.4	10.5	15.2
Applied sciences and technologies	49.3	50.5	31.9	27.5	28.8	31.0	11.6	11.8	11.0	8.2
Engineering sciences	28.9	27.4	47.2	53.2	52.7	52.4	58.2	52.1	51.6	51.6
Biological sciences	0.2	0.2	0.3	0.2	0.2	0.0	0.0	0.3	1.3	1.0
Agricultural sciences	0.3	0.3	0.2	0.1	0.0	0.4	0.6	0.1	0.5	0.4
Medical and health sciences	0.3	0.3	0.0	0.0	0.0	1.0	1.3	1.2	1.1	2.5
Environmental sciences	2.9	3.0	2.9	2.5	2.5	0.2	0.0	2.8	2.9	3.0
Material sciences	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5
Marine sciences	0.4	0.4	0.4	0.3	0.3	0.0	0.0	0.4	0.4	0.2
Division 2: Social Sciences and Humanities	**0.9**	**0.9**	**0.9**	**0.8**	**0.8**	**0.9**	**0.0**	**0.0**	**0.0**	**2.8**
Social sciences	0.9	0.9	0.9	0.8	0.8	0.9	0.0	0.0	0.0	2.8
Humanities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table C.67: Business sector: SOEs – R&D expenditure by Socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**528 914**	**560 704**	**642 320**	**675 517**	**696 861**	**718 698**	**356 627**	**485 487**	**512 440**	**563 927**
Defence	528 914	560 704	642 320	675 517	696 861	718 698	356 627	485 487	512 440	563 927
Division 2: Economic Development	**448 292**	**498 239**	**526 583**	**660 673**	**725 787**	**673 212**	**772 791**	**819 342**	**874 294**	**1 174 044**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant production and plant primary products	569	643	736	781	823	2 398	2 000			
Animal production and animal primary products	7 800	8 814	6 388	2 877	2 396	1 704	4 069			0
Mineral resources (excluding Energy)	3 028	2 334	2 674			5 576	6 247	6 433	6 541	6 996
Energy resources	19 755	7 523	9 719	12 938	28 079	20 075	22 488	23 158	23 549	25 185
Energy supply	174 022	203 000	213 649	334 360	355 509	405 120	367 866	249 963	253 757	419 084
Manufacturing	22 577	36 108	22 089	21 896	43 790	26 828	57 794	74 994	102 692	175 498
Construction	27 329	30 881	35 373	35 373	37 292		26 433	70 899	99 484	81 944
Transport	134 800	143 562	164 445	179 472	181 332	156 338	60 839	125 965	122 633	126 069
Information and communication services	40 077	44 654	47 776	44 360	46 766	35 131	179 318	193 815	191 811	270 175
Commercial services	11 048	12 485	14 301	19 183	19 856	19 290	1 504	9 248	9 974	10 715
Economic framework	7 288	8 235	9 433	9 433	9 944		17 049	36 408	40 833	37 065
Natural resources						752	27 185	28 459	23 019	21 316
Division 3: Society	**9 461**	**9 603**	**37 707**	**50 665**	**55 826**	**61 017**	**57 479**	**46 227**	**58 501**	**66 652**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health			13 353	20 898	24 288	25 320	22 992	19 743	29 360	26 193
Education and training	1 892	2 138	2 449	2 609	2 750	3 052	11 496	10 862	13 281	14 266
Social development and community services	7 569	7 465	21 905	27 159	28 788	32 645	22 992	15 623	15 860	26 193
Division 4: Environment	**1 324**	**1 497**	**28 420**	**43 621**	**46 300**	**55 984**	**47 487**	**31 245**	**31 720**	**68 425**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental knowledge			13 353	20 898	22 188	25 696	23 368	15 623	15 860	26 193
Environmental aspects of development	1 324	1 497	1 714	1 826	1 925	3 841				16 040
Environmental and other aspects			13 353	20 898	22 188	26 448	24 119	15 623	15 860	26 193

Division 5: Advancement of Knowledge	**27 126**	**46 302**	**73 394**	**78 602**	**87 391**	**83 891**	**86 108**	**116 819**	**119 417**	**132 476**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural sciences, technologies and engineering	23 721	42 454	68 986	73 906	82 441	75 716	83 349	113 836	116 668	129 393
Social sciences and humanities	3 406	3 848	4 408	4 696	4 951	8 176	2 758	2 983	2 750	3 083
Total	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

Table C.68: Business sector: SOEs – Proportional R&D expenditure by research field (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**52.1**	**50.2**	**49.1**	**44.8**	**43.2**	**45.1**	**27.0**	**32.4**	**32.1**	**28.1**
Defence	52.1	50.2	49.1	44.8	43.2	45.1	27.0	32.4	32.1	28.1
Division 2: Economic Development	**44.2**	**44.6**	**40.2**	**43.8**	**45.0**	**42.3**	**58.5**	**54.7**	**54.8**	**58.5**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0
Animal production and animal primary products	0.8	0.8	0.5	0.2	0.1	0.1	0.3	0.0	0.0	0.0
Mineral resources (excluding Energy)	0.3	0.2	0.2	0.0	0.0	0.4	0.5	0.4	0.4	0.3
Energy resources	1.9	0.7	0.7	0.9	1.7	1.3	1.7	1.5	1.5	1.3
Energy supply	17.1	18.2	16.3	22.2	22.1	25.4	27.9	16.7	15.9	20.9
Manufacturing	2.2	3.2	1.7	1.5	2.7	1.7	4.4	5.0	6.4	8.8
Construction	2.7	2.8	2.7	2.3	2.3	0.0	2.0	4.7	6.2	4.1
Transport	13.3	12.9	12.6	11.9	11.2	9.8	4.6	8.4	7.7	6.3
Information and communication services	3.9	4.0	3.7	2.9	2.9	2.2	13.6	12.9	12.0	13.5
Commercial services	1.1	1.1	1.1	1.3	1.2	1.2	0.1	0.6	0.6	0.5
Economic framework	0.7	0.7	0.7	0.6	0.6	0.0	1.3	2.4	2.6	1.8
Natural resources	0.0	0.0	0.0	0.0	0.0	0.0	2.1	1.9	1.4	1.1
Division 3: Society	**0.9**	**0.9**	**2.9**	**3.4**	**3.5**	**3.8**	**4.4**	**3.1**	**3.7**	**3.3**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	0.0	0.0	1.0	1.4	1.5	1.6	1.7	1.3	1.8	1.3
Education and training	0.2	0.2	0.2	0.2	0.2	0.2	0.9	0.7	0.8	0.7
Social development and community services	0.7	0.7	1.7	1.8	1.8	2.0	1.7	1.0	1.0	1.3
Division 4: Environment	**0.1**	**0.1**	**2.2**	**2.9**	**2.9**	**3.5**	**3.6**	**2.1**	**2.0**	**3.4**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	0.0	0.0	1.0	1.4	1.4	1.6	1.8	1.0	1.0	1.3
Environmental aspects of development	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.8
Environmental and other aspects	0.0	0.0	1.0	1.4	1.4	1.7	1.8	1.0	1.0	1.3
Division 5: Advancement of Knowledge	**2.7**	**4.1**	**5.6**	**5.2**	**5.4**	**5.3**	**6.5**	**7.8**	**7.5**	**6.6**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	2.3	3.8	5.3	4.9	5.1	4.8	6.3	7.6	7.3	6.5
Social sciences and humanities	0.3	0.3	0.3	0.3	0.3	0.5	0.2	0.2	0.2	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table C.69: Business sector: SOEs – R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	7 288	8 235	12 103	16 648	17 582	12 562	21 897	33 436	38 634	37 244
Free State	7 041	7 956	9 242	3 938	17 432	24 865	31 842	28 367	26 428	25 193
Gauteng	770 463	852 604	982 369	1 141 174	1 142 391	1 170 277	917 624	1 014 194	1 012 556	1 448 092
KwaZulu-Natal	11 287	12 753	27 961	45 135	67 037	54 956	61 339	65 187	90 066	44 149
Limpopo	0	0	128	0	0	7 157	15 917	17 144	18 256	17 173
Mpumalanga	0	0	0	0	0	7 157	15 917	18 008	18 256	22 412
North-West	56 443	79 895	93 832	109 981	138 305	118 682	140 853	151 514	160 739	289 990
Northern Cape	0	0	0	0	0	7 157	17 446	18 630	52 104	17 998
Western Cape	162 597	154 902	182 788	192 202	229 419	189 991	97 655	152 641	179 332	103 275
Total	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

Table C.70: Business sector: SOEs – Proportional R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	0.7	0.7	0.9	1.1	1.1	0.8	1.7	2.2	2.4	1.9
Free State	0.7	0.7	0.7	0.3	1.1	1.6	2.4	1.9	1.7	1.3
Gauteng	75.9	76.4	75.1	75.6	70.9	73.5	69.5	67.7	63.4	72.2
KwaZulu-Natal	1.1	1.1	2.1	3.0	4.2	3.5	4.6	4.3	5.6	2.2
Limpopo	0.0	0.0	0.0	0.0	0.0	0.4	1.2	1.1	1.1	0.9
Mpumalanga	0.0	0.0	0.0	0.0	0.0	0.4	1.2	1.2	1.1	1.1
North-West	5.6	7.2	7.2	7.3	8.6	7.5	10.7	10.1	10.1	14.5
Northern Cape	0.0	0.0	0.0	0.0	0.0	0.4	1.3	1.2	3.3	0.9
Western Cape	16.0	13.9	14.0	12.7	14.2	11.9	7.4	10.2	11.2	5.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table C.71: Business sector: SOEs – R&D expenditure by Standard Industrial Classification code (2005/06 to 2014/15)

STANDARD INDUSTRIAL CLASSIFICATION	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Agriculture, Hunting, Forestry and Fishing	**0**	**0**	**1 278**	**575**	**479**	**0**	**0**	**982**	**5 127**	**5 459**
Mining and Quarrying	**569**	**643**	**736**	**781**	**823**	**2 398**	**0**	**0**	**0**	**0**
Manufacturing	**417 918**	**442 852**	**493 453**	**552 419**	**547 593**	**530 635**	**250 309**	**442 895**	**473 954**	**479 161**
Manufacture of Food Products, Beverages and Tobacco Products	0	0	0	0	0	0	0	0	0	0
Manufacture of Textiles, Clothing and Leather Goods	0	0	0	0	0	0	0	0	0	0
Manufacture of Wood and Products of Wood and Cork, except furniture; Manufacture of Articles of Straw and Plaiting Materials; Manufacture of Paper and Paper Products; Manufacture of Publishing, Printing and Reproduction of Recorded Material	0	0	0	0	0	0	0	0	0	0
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	59 695	57 344	57 797	74 080	99 411	61 654	60 362	69 607	72 216	77 350
Manufacture of Non-Metallic Mineral Products	0	7 523	2 651	0	0	6 692	7 496	7 719	7 850	8 395
Manufacture of Basic Metals, Fabricated Metal Products, Machinery and Equipment; Manufacture of Office, Accounting and Computing Machinery	36 334	28 011	32 089	20 798	21 252	0	84 285	224 661	272 253	293 575
Manufacture of Electrical Machinery and Apparatus	40 000	45 200	51 780	54 943	0	0	88 159	76 590	63 824	52 760
Manufacture of Radio, Television and Communication Equipment and Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	0	0	0	0	0	0	0	0	0	0
Manufacture of Transport Equipment	271 018	304 774	349 136	402 599	426 930	462 290	10 007	64 318	57 812	47 081
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	10 872	0	0	0	0	0	0	0	0	0
Electricity, Gas and Water Supply	**182 217**	**212 260**	**277 668**	**429 203**	**474 310**	**520 765**	**463 592**	**325 822**	**340 670**	**534 569**
Construction	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Wholesale and Retail	**1 892**	**2 138**	**2 449**	**2 609**	**2 750**	**3 052**	**0**	**0**	**0**	**0**
Transport, Storage and Communication	**179 435**	**193 367**	**218 121**	**176 362**	**179 602**	**164 337**	**304 346**	**371 495**	**397 326**	**565 363**
Financial Intermediation, Real Estate and Business Services	**94 958**	**111 098**	**138 320**	**166 910**	**174 960**	**110 240**	**302 245**	**137 898**	**158 060**	**150 347**
Community, Social and Personal Services	**138 129**	**153 987**	**176 401**	**180 218**	**231 648**	**261 375**	**0**	**220 029**	**221 233**	**270 626**
Total	**1 015 118**	**1 116 345**	**1 308 424**	**1 509 078**	**1 612 166**	**1 592 803**	**1 320 492**	**1 499 121**	**1 596 371**	**2 005 525**

Table C.72: Business sector: SOEs – Proportional R&D expenditure by Standard Industrial Classification code (2005/06 to 2014/15)

STANDARD INDUSTRIAL	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Agriculture, Hunting, Forestry and Fishing	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.3**	**0.3**
Mining and Quarrying	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**
Manufacturing	**41.2**	**39.7**	**37.7**	**36.6**	**34.0**	**33.3**	**19.0**	**29.5**	**29.7**	**23.9**
Manufacture of Food Products, Beverages and Tobacco Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacture of Textiles, Clothing and Leather Goods	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacture of Wood and Products of Wood and Cork, except furniture; Manufacture of Articles of Straw and Plaiting Materials; Manufacture of Paper and Paper Products; Manufacture of Publishing, Printing and Reproduction of Recorded Material	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacture of Refined Petroleum, Coke and Nuclear Fuel; Manufacture of Chemicals and Chemical Products (incl. Pharmaceuticals); Manufacture of Rubber and Plastic Products	5.9	5.1	4.4	4.9	6.2	3.9	4.6	4.6	4.5	3.9
Manufacture of Non-Metallic Mineral Products	0.0	0.7	0.2	0.0	0.0	0.4	0.6	0.5	0.5	0.4
Manufacture of Basic Metals, Fabricated Metal Products, Machinery and Equipment; Manufacture of Office, Accounting and Computing Machinery	3.6	2.5	2.5	1.4	1.3	0.0	6.4	15.0	17.1	14.6
Manufacture of Electrical Machinery and Apparatus	3.9	4.0	4.0	3.6	0.0	0.0	6.7	5.1	4.0	2.6
Manufacture of Radio, Television and Communication Equipment and Apparatus; Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacture of Transport Equipment	26.7	27.3	26.7	26.7	26.5	29.0	0.8	4.3	3.6	2.3
Manufacture of Furniture; Recycling; Manufacturing not elsewhere classified	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity, Gas and Water Supply	18.0	19.0	21.2	28.4	29.4	32.7	35.1	21.7	21.3	26.7
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wholesale and Retail	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0
Transport, Storage and Communication	17.7	17.3	16.7	11.7	11.1	10.3	23.0	24.8	24.9	28.2
Financial Intermediation, Real Estate and Business Services	9.4	10.0	10.6	11.1	10.9	6.9	22.9	9.2	9.9	7.5
Community, Social and Personal Services	13.6	13.8	13.5	11.9	14.4	16.4	0.0	14.7	13.9	13.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table C.73: Business sector: SOEs – R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	HEADCOUNTS				FULL-TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2005/06	**1 851**	753	552	546	1 563.6	673.6	453.1	436.9
2006/07	**1 898**	818	573	507	1 595.4	712.0	477.7	405.7
2007/08	**2 152**	905	615	632	1 510.9	673.0	469.2	368.7
2008/09	**2 229**	953	685	591	1 595.1	718.7	521.4	355.0
2009/10	**2 147**	919	652	576	1 564.7	711.0	489.3	364.5
2010/11	**1 824**	738	665	421	1 297.5	557.0	473.0	267.6
2011/12	**2 337**	842	1 018	477	1 047.5	440.2	430.0	177.3
2012/13	**2 686**	885	1 343	458	1 246.7	525.4	530.7	190.6
2013/14	**2 659**	886	1 327	446	1 241.1	515.8	542.4	182.9
2014/15	**2 745**	912	1 472	361	1 320.3	535.5	586.2	198.7

Table C.74: Business sector: SOEs – R&D personnel in headcounts and full-time equivalents by occupation and gender (2012/13, 2013/14, and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	885	729	156	525.4	444.1	81.3	59.4
Technicians directly supporting R&D	1 343	1 030	313	530.7	458.7	72.0	39.5
Other personnel directly supporting R&D	458	216	242	190.6	83.8	106.9	41.6
Total	**2 686**	**1 975**	**711**	**1 246.7**	**986.6**	**260.1**	**46.4**
2013/14	**TOTAL**	**MALE**	**FEMALE**	**TOTAL**	**MALE**	**FEMALE**	**FTEs AS % OF HEADCOUNTS**
Researchers	886	727	159	515.8	433.1	82.7	58.2
Technicians directly supporting R&D	1 327	1 039	288	542.4	469.0	73.4	40.9
Other personnel directly supporting R&D	446	204	242	182.9	81.4	101.5	41.0
Total	**2 659**	**1 970**	**689**	**1 241.1**	**983.5**	**257.6**	**46.7**
2014/15	**TOTAL**	**MALE**	**FEMALE**	**TOTAL**	**MALE**	**FEMALE**	**FTEs AS % OF HEADCOUNTS**
Researchers	912	746	166	535.5	428.7	106.8	58.7
Technicians directly supporting R&D	1 472	1 110	362	586.2	480.2	106.0	39.8
Other personnel directly supporting R&D	361	178	183	198.7	85.2	113.5	55.0
Total	**2 745**	**2 034**	**711**	**1 320.3**	**994.1**	**326.3**	**48.1**

Table C.75: Business sector: SOEs – R&D personnel in headcounts by occupation, qualification, population group and gender (2014/15)

OCCUPATION AND QUALIFICATION	TOTAL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	**912**	**746**	**166**	**125**	**54**	**33**	**9**	**83**	**22**	**506**	**82**
Doctoral degree or equivalent	57	44	13	10	4	0	0	0	0	35	9
Masters, Honours, bachelor or equivalent	728	592	136	102	39	33	6	73	22	385	69
Diplomas	127	110	17	13	11	0	2	10	0	87	4
Technicians directly supporting R&D	**1 472**	**1 110**	**362**	**496**	**241**	**53**	**25**	**49**	**21**	**512**	**75**
Doctoral degree or equivalent	6	6	0	2	0	2	0	0	0	2	0
Masters, Honours, bachelor or equivalent	432	309	123	145	78	8	7	21	12	135	25
Diplomas	1 034	795	239	350	162	43	18	27	9	375	50
Other personnel directly supporting R&D	**361**	**178**	**183**	**107**	**87**	**12**	**18**	**5**	**0**	**54**	**77**
Doctoral degree or equivalent	0	0	0	0	0	0	0	0	0	0	0
Masters, Honours, bachelor or equivalent	30	14	16	3	8	0	2	3	0	7	6
Diplomas	331	164	167	104	79	12	16	2	0	47	71
Total	**2 745**	**2 034**	**711**	**728**	**382**	**98**	**52**	**137**	**43**	**1 071**	**234**

C.2.2. Not-for-profit sector

The NPO sector substantially increased coverage in 2014/15, similar to what had happened in 2012/13. This additional coverage contribution to the 2014/15 NPO R&D expenditure was 23.8%. Care is advised when making inferences on trends in the NPO sector.

Table C.76: Not-for-profit sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	57 877	54 915	65 337	70 725	111 377	59 302	62 134	114 755	132 478	181 492
Applied research	123 609	110 698	119 982	131 259	53 530	87 435	79 105	346 179	322 295	426 132
Experimental research	45 026	46 925	37 883	38 665	23 933	16 092	29 366	42 898	128 391	171 149
Total	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**	**583 165**	**778 772**

The NPO sector in 2012/13 improved coverage by R281 509 contributing 1.2% of GERD. In 2014/15 the NPO sector improved coverage by R185 302, contributing 0.6% of GERD.

Table C.77: Proportional not-for-profit sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Basic research	25.5	25.8	29.3	29.4	59.0	36.4	36.4	22.8	22.7	23.3
Applied research	54.6	52.1	53.8	54.5	28.3	53.7	46.4	68.7	55.3	54.7
Experimental research	19.9	22.1	17.0	16.1	12.7	9.9	17.2	8.5	22.0	22.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.78: Not-for-profit sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	10 092	6 974	7 025	7 249	8 564	8 820	18 702	37 564	39 983	49 647
Land: buildings and other structures	2 336	2 624	2 959	3 137	3 486	4 447	6 905	11 152	19 047	18 794
Vehicles, plant, machinery, equipment	7 756	4 350	4 066	4 112	5 078	4 373	11 797	26 412	20 936	30 853
Current expenditure	216 422	205 564	216 177	233 400	180 276	154 010	151 903	466 269	543 182	729 125
Labour costs	85 511	98 631	109 147	114 292	94 673	92 098	100 176	243 871	303 644	420 462
Other current expenditure	130 911	106 933	107 030	119 108	85 603	61 912	51 727	222 398	239 538	308 663
Total	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**	**583 165**	**778 772**

Table C.79: Proportional not-for-profit sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	4.5	3.3	3.1	3.0	4.5	5.4	11.0	7.5	6.9	6.4
Land: buildings and other structures	1.0	1.2	1.3	1.3	1.8	2.7	4.0	2.2	3.3	2.4
Vehicles, plant, machinery, equipment	3.4	2.0	1.8	1.7	2.7	2.7	6.9	5.2	3.6	4.0
Current expenditure	95.5	96.7	96.9	97.0	95.5	94.6	89.0	92.5	93.1	93.6
Labour costs	37.8	46.4	48.9	47.5	50.1	56.6	58.7	48.4	52.1	54.0
Other current expenditure	57.8	50.3	48.0	49.5	45.3	38.0	30.3	44.1	41.1	39.6
Total	100	100	100	100	100	100	100	100	100	100

Table C.80: Not-for-profit sector (NPO) expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	206	429	491	255	4 446	5 666	8 667	29 062	62 082	128 964
Nanotechnology	0	0	0	0	0	1 475	0	10 187	4 915	70 348
Total	**206**	**429**	**491**	**255**	**4 446**	**7 141**	**8 667**	**39 249**	**66 997**	**199 312**
NPO expenditure on R&D	226 514	212 538	223 202	240 649	188 840	162 830	170 605	503 833	583 165	778 772

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

Table C.81: Proportional not-for-profit sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Biotechnology	0.1	0.2	0.2	0.1	2.4	3.5	5.1	5.8	10.6	16.6
Nanotechnology	0.0	0.0	0.0	0.0	0.0	0.9	0.0	2.0	0.8	9.0
Total	**0.1**	**0.2**	**0.2**	**0.1**	**2.4**	**4.4**	**5.1**	**7.8**	**11.5**	**25.6**

Note: Data on these multidisciplinary areas of R&D were collected for the first time in the 2005/06 R&D survey.

Table C.82: Not-for-profit sector (NPO) R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	15 133	18 022	27 142	50 364
Open source software	7 700	4 973	0	0	0	0	20	419	481	69 509
New materials	0	1 783	0	0	542	830	395	178	191	634
Tuberculosis (TB), HIV/ AIDS, malaria	3 736	4 215	0	8 763	7 419	13 979	5 034	246 760	301 086	374 460
Total	**11 436**	**10 971**	**0**	**8 763**	**7 962**	**14 809**	**20 581**	**265 379**	**328 901**	**494 966**
NPO expenditure on R&D	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**	**583 165**	**778 772**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.83: Proportional not-for-profit sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	8.9	3.6	4.7	6.5
Open source software	3.4	2.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	8.9
New materials	0.0	0.8	0.0	0.0	0.3	0.5	0.2	0.0	0.0	0.1
Tuberculosis (TB), HIV/ AIDS, malaria	1.6	2.0	0.0	3.6	3.9	8.6	3.0	49.0	51.6	48.1
Total	**5.0**	**5.2**	**0.0**	**3.6**	**4.2**	**9.1**	**12.1**	**52.7**	**56.4**	**63.6**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.84: Not-for-profit sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**54 740**	**53 937**	**61 494**	**72 018**	**53 112**	**54 776**	**64 042**	**346 961**	**427 237**	**647 068**
Mathematical sciences	0	0	0	1 041	0	0	0	8 223	9 674	14 613
Physical sciences	0	0	0	0	6 422	0	0	765	802	989
Chemical sciences	0	0	0	0	0	0	0	0	1 309	0
Earth sciences	158	185	459	1 012	452	2 585	2 407	2 598	5 907	8 371
Information, computer and communication technologies	789	925	1 446	1 555	2 207	0	595	2 919	39	197
Applied sciences and technologies	5 775	1 407	0	0	0	0	1 487	4 317	4 666	19 123
Engineering sciences	0	0	0	0	0	0	0	4 075	4 915	4 638
Biological sciences	1 630	1 874	2 005	2 126	904	1 473	7 978	15 475	23 435	23 338
Agricultural sciences	16 507	17 234	18 324	19 426	20 404	25 679	25 819	33 105	34 165	53 777
Medical and health sciences	23 748	25 237	29 603	36 032	13 999	15 920	17 423	265 031	329 293	497 588
Environmental sciences	3 531	3 097	7 363	8 396	6 014	3 433	7 553	10 122	12 238	23 548
Material sciences	0	0	0	0	0	0	0	0	0	0
Marine sciences	2 602	3 978	2 294	2 431	2 711	5 687	781	331	794	886
Division 2: Social Sciences and Humanities	**171 774**	**158 601**	**161 708**	**168 631**	**135 728**	**108 054**	**106 563**	**156 872**	**155 928**	**131 705**
Social sciences	170 126	156 574	159 155	165 924	133 340	104 306	104 842	142 525	147 029	122 105
Humanities	1 648	2 027	2 553	2 707	2 388	3 749	1 720	14 348	8 898	9 599
Total	**226 514**	**212 538**	**223 202**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**	**583 165**	**778 772**

Table C.85: Proportional not-for-profit sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**24.2**	**25.4**	**27.6**	**29.9**	**28.1**	**33.6**	**37.5**	**68.9**	**73.3**	**83.1**
Mathematical sciences	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.6	1.7	1.9
Physical sciences	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.2	0.1	0.1
Chemical sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Earth sciences	0.1	0.1	0.2	0.4	0.2	1.6	1.4	0.5	1.0	1.1
Information, computer and communication technologies	0.3	0.4	0.6	0.6	1.2	0.0	0.3	0.6	0.0	0.0
Applied sciences and technologies	2.5	0.7	0.0	0.0	0.0	0.0	0.9	0.9	0.8	2.5
Engineering sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.6
Biological sciences	0.7	0.9	0.9	0.9	0.5	0.9	4.7	3.1	4.0	3.0
Agricultural sciences	7.3	8.1	8.2	8.1	10.8	15.8	15.1	6.6	5.9	6.9
Medical and health sciences	10.5	11.9	13.3	15.0	7.4	9.8	10.2	52.6	56.5	63.9
Environmental sciences	1.6	1.5	3.3	3.5	3.2	2.1	4.4	2.0	2.1	3.0
Material sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marine sciences	1.1	1.9	1.0	1.0	1.4	3.5	0.5	0.1	0.1	0.1
Division 2: Social Sciences and Humanities	**75.8**	**74.6**	**72.4**	**70.1**	**71.9**	**66.4**	**62.5**	**31.1**	**26.7**	**16.9**
Social sciences	75.1	73.7	71.3	68.9	70.6	64.1	61.5	28.3	25.2	15.7
Humanities	0.7	1.0	1.1	1.1	1.3	2.3	1.0	2.8	1.5	1.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.86: Not-for-profit sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**1 161**	**1 312**	**1 438**	**2 050**	**1 600**	**0**	**0**	**0**	**0**	**690**
Defence	1 161	1 312	1 438	2 050	1 600	0	0	0	0	690
Division 2: Economic Development	**58 983**	**61 743**	**63 450**	**69 810**	**71 939**	**65 777**	**60 758**	**110 866**	**113 991**	**152 573**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant production and plant primary products	13 747	13 996	16 030	17 520	18 873	25 441	24 850	36 127	35 511	28 974
Animal production and animal primary products	1 577	1 850	918	972	1 632	1 389	828	2 538	3 083	4 000
Mineral resources (excluding Energy)	0	0	0	0	0	763	0	8 150	9 831	9 242
Energy resources	581	656	1 000	1 760	2 604	1 653	969	2 538	3 083	3 993
Energy supply	1 161	1 312	1 438	2 575	3 774	3 307	3 430	4 363	8 690	7 663
Manufacturing	0	0	0	0	0	0	2 197	3 896	2 955	26 291
Construction	0	0	0	0	0	0	0	0	0	0
Transport	0	0	70	74	208	0	137	465	424	0
Information and communication services	1 183	1 388	0	0	0	0	1 480	2 031	1 823	316
Commercial services	2 396	622	782	827	970	0	0	0	0	0
Economic framework	34 253	37 516	36 588	39 059	39 463	27 068	22 228	45 252	42 423	54 435
Natural resources	4 086	4 403	6 624	7 022	4 414	6 157	4 640	5 507	6 167	17 659
Division 3: Society	**147 288**	**127 170**	**129 159**	**141 189**	**93 947**	**82 481**	**75 597**	**360 333**	**415 093**	**555 151**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	26 824	28 057	33 549	37 461	16 554	15 050	13 496	260 712	303 535	449 619
Education and training	72 160	38 907	32 161	32 308	19 986	22 303	23 762	58 894	63 833	61 150
Social development and community services	48 304	60 206	63 449	71 420	57 407	45 128	38 339	40 726	47 725	44 382
Division 4: Environment	**3 870**	**4 493**	**5 885**	**6 937**	**7 052**	**10 051**	**13 356**	**12 841**	**15 044**	**16 135**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental knowledge	949	1 090	2 553	3 406	3 577	6 139	7 233	4 716	7 845	8 697
Environmental aspects of development	185	209	559	593	683	504	3 746	5 771	4 545	4 569
Environmental and other aspects	2 736	3 194	2 773	2 938	2 792	3 408	2 377	2 355	2 654	2 869
Division 5: Advancement of Knowledge	**15 211**	**17 819**	**23 271**	**20 663**	**14 303**	**4 521**	**20 895**	**19 793**	**39 036**	**54 223**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural sciences, technologies and engineering	789	925	459	486	452	632	13 166	7 754	31 450	42 017
Social sciences and humanities	14 422	16 894	22 812	20 177	13 851	3 889	7 729	12 039	7 586	12 206
Total	**226 514**	**212 537**	**223 203**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**	**583 165**	**778 772**

Table C.87: Proportional not-for-profit sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**0.5**	**0.6**	**0.6**	**0.9**	**0.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
Defence	0.5	0.6	0.6	0.9	0.8	0.0	0.0	0.0	0.0	0.1
Division 2: Economic Development	**26.0**	**29.1**	**28.4**	**29.0**	**38.1**	**40.4**	**35.6**	**22.0**	**19.5**	**19.6**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	6.1	6.6	7.2	7.3	10.0	15.6	14.6	7.2	6.1	3.7
Animal production and animal primary products	0.7	0.9	0.4	0.4	0.9	0.9	0.5	0.5	0.5	0.5
Mineral resources (excluding Energy)	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.6	1.7	1.2
Energy resources	0.3	0.3	0.4	0.7	1.4	1.0	0.6	0.5	0.5	0.5
Energy supply	0.5	0.6	0.6	1.1	2.0	2.0	2.0	0.9	1.5	1.0
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8	0.5	3.4
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transport	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0
Information and communication services	0.5	0.7	0.0	0.0	0.0	0.0	0.9	0.4	0.3	0.0
Commercial services	1.1	0.3	0.4	0.3	0.5	0.0	0.0	0.0	0.0	0.0
Economic framework	15.1	17.7	16.4	16.2	20.9	16.6	13.0	9.0	7.3	7.0
Natural resources	1.8	2.1	3.0	2.9	2.3	3.8	2.7	1.1	1.1	2.3
Division 3: Society	**65.0**	**59.8**	**57.9**	**58.7**	**49.7**	**50.7**	**44.3**	**71.5**	**71.2**	**71.3**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	11.8	13.2	15.0	15.6	8.8	9.2	7.9	51.7	52.0	57.7
Education and training	31.9	18.3	14.4	13.4	10.6	13.7	13.9	11.7	10.9	7.9
Social development and community services	21.3	28.3	28.4	29.7	30.4	27.7	22.5	8.1	8.2	5.7
Division 4: Environment	**1.7**	**2.1**	**2.6**	**2.9**	**3.7**	**6.2**	**7.8**	**2.5**	**2.6**	**2.1**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	0.4	0.5	1.1	1.4	1.9	3.8	4.2	0.9	1.3	1.1
Environmental aspects of development	0.1	0.1	0.3	0.2	0.4	0.3	2.2	1.1	0.8	0.6
Environmental and other aspects	1.2	1.5	1.2	1.2	1.5	2.1	1.4	0.5	0.5	0.4
Division 5: Advancement of Knowledge	**6.7**	**8.4**	**10.4**	**8.6**	**7.6**	**2.8**	**12.2**	**3.9**	**6.7**	**7.0**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	0.3	0.4	0.2	0.2	0.2	0.4	7.7	1.5	5.4	5.4
Social sciences and humanities	6.4	7.9	10.2	8.4	7.3	2.4	4.5	2.4	1.3	1.6
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.88: Not-for-profit sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	6 589	4 850	6 164	6 790	8 136	9 790	9 493	25 610	25 478	27 219
Free State	3 687	1 974	1 255	4 763	4 418	6 385	5 096	15 297	15 953	14 214
Gauteng	104 002	102 141	115 499	126 136	104 420	61 496	69 321	162 866	175 651	287 783
KwaZulu-Natal	35 036	42 902	42 141	40 492	30 548	35 765	33 740	163 221	166 603	181 052
Limpopo	5 329	3 979	4 602	5 138	4 524	4 541	7 449	11 779	13 719	49 971
Mpumalanga	10 238	9 131	9 930	10 332	8 311	13 206	16 027	23 195	26 979	30 594
North-West	3 547	1 974	2 207	2 339	2 382	5 612	6 353	42 960	72 446	105 904
Northern Cape	1 650	1 736	2 038	2 159	4 493	2 030	1 889	3 867	3 583	1 546
Western Cape	56 436	43 852	39 367	42 500	21 609	24 003	21 236	55 038	82 753	80 489
Total	**226 514**	**212 538**	**223 203**	**240 649**	**188 840**	**162 830**	**170 605**	**503 833**	**583 165**	**778 772**

Table C.89: Proportional not-for-profit sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	2.9	2.3	2.8	2.8	4.3	6.0	5.6	5.1	4.4	3.5
Free State	1.6	0.9	0.6	2.0	2.3	3.9	3.0	3.0	2.7	1.8
Gauteng	45.9	48.1	51.7	52.4	55.3	37.8	40.6	32.3	30.1	37.0
KwaZulu-Natal	15.5	20.2	18.9	16.8	16.2	22.0	19.8	32.4	28.6	23.2
Limpopo	2.4	1.9	2.1	2.1	2.4	2.8	4.4	2.3	2.4	6.4
Mpumalanga	4.5	4.3	4.4	4.3	4.4	8.1	9.4	4.6	4.6	3.9
North-West	1.6	0.8	1.0	0.9	2.4	3.4	1.1	8.5	12.4	13.6
Northern Cape	0.7	0.9	0.9	1.0	1.3	1.2	3.7	0.8	0.6	0.2
Western Cape	24.9	20.6	17.6	17.7	11.4	14.7	12.4	10.9	14.2	10.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.90: Not-for-profit sector R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2005/06	**485**	243	84	158	364.9	198.6	59.0	107.3
2006/07	**484**	252	77	155	362.7	203.6	55.3	103.9
2007/08	**502**	264	77	161	379.1	215.6	56.5	107.0
2008/09	**502**	262	77	163	366.4	207.6	56.5	102.3
2009/10	**380**	224	76	80	309.7	187.5	63.7	58.6
2010/11	**400**	250	49	101	313.1	196.2	47.6	69.3
2011/12	**405**	254	56	95	312.1	190.8	47.2	74.1
2012/13	**906**	394	132	380	768.0	294.5	114.2	359.4
2013/14	**1017**	435	205	377	891.4	338.4	195.1	357.9
2014/15	**1471**	506	368	597	1231.2	396.0	355.5	479.8

Table C.91: Not-for-profit sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	394	184	210	294.5	137.3	157.2	74.7
Technicians directly supporting R&D	132	62	70	114.2	55.9	58.3	86.5
Other personnel directly supporting R&D	380	73	307	359.4	71.2	288.3	94.6
Total	**906**	**319**	**587**	**768.0**	**264.3**	**503.7**	**84.8**
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	435	202	233	338.4	155.6	182.9	77.8
Technicians directly supporting R&D	205	74	131	195.1	68.0	127.1	95.2
Other personnel directly supporting R&D	377	81	296	357.9	77.9	280.0	94.9
Total	**1017**	**357**	**660**	**891.4**	**301.4**	**590.0**	**87.6**
2014/15	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	506	234	272	396.0	177.1	218.9	78.3
Technicians directly supporting R&D	368	116	252	355.5	110.0	245.5	96.6
Other personnel directly supporting R&D	597	167	430	479.8	123.4	356.3	80.4
Total	**1471**	**517**	**954**	**1231.2**	**410.5**	**820.7**	**83.7**

Table C.92: Not-for-profit sector R&D personnel in headcounts by occupation, qualification, population group and gender (2014/15)

OCCUPATION AND QUALIFICATION	TOTAL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	**506**	**234**	**272**	**103**	**100**	**15**	**30**	**15**	**24**	**101**	**118**
Doctoral degree or equivalent	117	71	46	23	9	4	7	1	4	43	26
Masters, Honours, bachelor or equivalent	279	125	154	51	48	9	16	12	15	53	75
Diplomas	110	38	72	29	43	2	7	2	5	5	17
Technicians directly supporting R&D	**368**	**116**	**252**	**81**	**158**	**15**	**41**	**3**	**16**	**17**	**37**
Doctoral degree or equivalent	6	2	4	1	1	1	0	0	0	0	3
Masters, Honours, bachelor or equivalent	164	47	117	28	53	9	25	2	11	8	28
Diplomas	198	67	131	52	104	5	16	1	5	9	6
Other personnel directly supporting R&D	**597**	**167**	**430**	**136**	**318**	**7**	**35**	**7**	**17**	**17**	**60**
Doctoral degree or equivalent	5	1	4	0	0	0	1	0	1	1	2
Masters, Honours, bachelor or equivalent	110	23	87	9	36	1	21	2	5	11	25
Diplomas	482	143	339	127	282	6	13	5	11	5	33
Total	**1471**	**517**	**954**	**320**	**576**	**37**	**106**	**25**	**57**	**135**	**215**

C.2.3. Government sector

Table C.93: Government sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000		R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	213 351	224 774		322 270	357 786	257 806	257 235	263 380	331 587	245 167	338 250
Applied research	459 042	521 845		599 162	601 688	621 762	600 205	812 067	873 469	1 194 866	1 292 421
Experimental research	172 247	274 736		232 967	180 202	187 734	153 900	160 223	232 453	257 118	262 339
Total	**844 640**	**1 021 355**		**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**	**1 697 151**	**1 893 010**

Table C.94: Proportional government sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Basic research	25.3	22.0	27.9	31.4	24.2	25.4	21.3	23.1	14.4	17.9
Applied research	54.3	51.1	51.9	52.8	58.3	59.3	65.7	60.8	70.4	68.3
Experimental research	20.4	26.9	20.2	15.8	17.6	15.2	13.0	16.2	15.2	13.8

Table C.95: Government sector R&D expenditure by spheres and institutes of government and accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Municipalities	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**14 959**	**65 541**	**59 418**	**62 485**
Capital expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**144**	**18 605**	**23 033**	**12 921**
Land: buildings and other structures	N/A	N/A	N/A	N/A	N/A	N/A	0	5 400	10 000	6 537
Vehicles, plant, machinery, equipment	N/A	N/A	N/A	N/A	N/A	N/A	144	13 205	13 033	6 384
Current expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**14 815**	**46 936**	**36 385**	**49 564**
Labour costs	N/A	N/A	N/A	N/A	N/A	N/A	12 715	30 131	27 513	39 314
Other current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	2 100	16 805	8 872	10 250
Provincial departments	**167 328**	**174 860**	**253 418**	**232 062**	**245 031**	**284 539**	**335 607**	**372 231**	**249 705**	**421 126**
Capital expenditure	**21 912**	**12 706**	**37 336**	**24 249**	**39 748**	**30 475**	**42 895**	**45 895**	**17 540**	**39 325**
Land: buildings and other structures	9 196	4 495	8 681	2 515	11 238	13 022	10 674	7 255	2 122	5 500
Vehicles, plant, machinery, equipment	12 716	8 211	28 655	21 734	28 510	17 453	32 221	38 640	15 418	33 825
Current expenditure	**145 416**	**162 154**	**216 082**	**207 813**	**205 283**	**254 064**	**292 712**	**326 336**	**232 165**	**381 801**
Labour costs	76 598	100 676	135 695	129 187	138 397	182 175	206 583	236 367	198 440	248 823
Other current expenditure	68 818	61 478	80 387	78 626	66 886	71 889	86 129	89 969	33 725	132 978
National departments	**304 709**	**489 971**	**499 085**	**287 333**	**240 412**	**211 176**	**280 005**	**321 632**	**390 301**	**248 041**
Capital expenditure	**55 321**	**48 920**	**22 507**	**9 340**	**2 022**	**38 629**	**31 879**	**32 669**	**45 930**	**4 406**
Land: buildings and other structures	67	3 701	0	1 107	500	3 657	11 820	12 783	6 348	811
Vehicles, plant, machinery, equipment	55 254	45 219	22 507	8 233	1 522	34 972	20 059	19 886	39 582	3 595
Current expenditure	**249 388**	**441 051**	**476 578**	**277 993**	**238 390**	**172 547**	**248 126**	**288 963**	**344 371**	**243 635**
Labour costs	51 747	158 890	120 257	98 791	81 619	144 779	140 146	158 808	233 321	150 921
Other current expenditure	197 641	282 161	356 321	179 202	156 771	27 768	107 980	130 155	111 050	92 714
Government research institutes	342 433	327 065	365 468	579 395	553 651	483 999	573 698	644 360	973 807	1 134 875
Capital expenditure	71 564	57 343	38 837	49 345	168 544	113 395	35 071	157 221	98 010	233 386
Land: buildings and other structures	38 414	31 602	10 225	9 955	115 101	43 360	2 487	58 280	4 542	93 477
Vehicles, plant, machinery, equipment	33 150	25 741	28 612	39 390	53 443	70 035	32 584	98 941	93 468	139 909
Current expenditure	270 869	269 722	326 631	530 050	385 107	370 604	538 627	487 139	875 797	901 489
Labour costs	160 554	148 117	183 167	224 691	245 767	269 965	316 835	355 503	316 256	375 939
Other current expenditure	110 315	121 605	143 464	305 359	139 340	100 639	221 792	131 636	559 541	525 550
Museums	30 170	29 459	36 428	40 886	28 208	31 626	31 400	33 745	23 920	26 484
Capital expenditure	2 437	1 908	1 644	4 002	4 087	3 699	3 256	649	946	1 996
Land: buildings and other structures	91	481	460	2 331	2 491	2 141	2 337	30	638	687
Vehicles, plant, machinery, equipment	2 346	1 427	1 184	1 671	1 596	1 558	919	619	308	1 309
Current expenditure	27 733	27 551	34 784	36 884	24 121	27 927	28 144	33 096	22 974	24 488
Labour costs	23 060	20 197	25 041	27 141	17 839	20 814	21 413	25 471	20 769	22 429
Other current expenditure	4 673	7 354	9 743	9 743	6 282	7 113	6 731	7 625	2 205	2 059

Government sector	844 640	1 021 355	1 154 399	1 139 676	1 067 302	1 011 340	1 235 669	1 437 509	1 697 151	1 893 010
Capital expenditure	**151 234**	**120 877**	**100 324**	**86 936**	**214 401**	**186 198**	**113 245**	**255 039**	**185 459**	**292 034**
Land: buildings and other structures	47 768	40 279	19 366	15 908	129 330	62 180	27 318	83 748	23 650	107 012
Vehicles, plant, machinery, equipment	103 466	80 598	80 958	71 028	85 071	124 018	85 927	171 291	161 809	185 022
Current expenditure	**693 406**	**900 478**	**1 054 075**	**1 052 740**	**852 901**	**825 142**	**1 122 424**	**1 182 470**	**1 511 692**	**1 600 976**
Labour costs	311 959	427 880	464 160	479 810	483 622	617 733	697 692	806 280	796 299	837 425
Other current expenditure	381 447	472 598	589 915	572 930	369 279	207 409	424 732	376 190	715 393	763 551

Note: N/A indicates that data was not collected during those years.

Table C.96: Proportional government sector R&D expenditure by spheres and institutes of government and accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Municipalities	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**100**	**100**	**100**	**100**
Capital expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1.0**	**28.4**	**38.8**	**20.7**
Land: buildings and other structures	N/A	N/A	N/A	N/A	N/A	N/A	0.0	8.2	16.8	10.5
Vehicles, plant, machinery, equipment	N/A	N/A	N/A	N/A	N/A	N/A	1.0	20.1	21.9	10.2
Current expenditure	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**99.0**	**71.6**	**61.2**	**79.3**
Labour costs	N/A	N/A	N/A	N/A	N/A	N/A	85.0	46.0	46.3	62.9
Other current expenditure	N/A	N/A	N/A	N/A	N/A	N/A	14.0	25.6	14.9	16.4
Provincial departments	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Capital expenditure	**13.1**	**7.3**	**14.7**	**10.4**	**16.2**	**10.7**	**12.8**	**12.3**	**7.0**	**9.3**
Land: buildings and other structures	5.5	2.6	3.4	1.1	4.6	4.6	3.2	1.9	0.8	1.3
Vehicles, plant, machinery, equipment	7.6	4.7	11.3	9.4	11.6	6.1	9.6	10.4	6.2	8.0
Current expenditure	**86.9**	**92.7**	**85.3**	**89.6**	**83.8**	**89.3**	**87.2**	**87.7**	**93.0**	**90.7**
Labour costs	45.8	57.6	53.5	55.7	56.5	64.0	61.6	63.5	79.5	59.1
Other current expenditure	41.1	35.2	31.7	33.9	27.3	25.3	25.7	24.2	13.5	31.6
National departments	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Capital expenditure	**18.2**	**10.0**	**4.5**	**3.3**	**0.8**	**18.3**	**11.4**	**10.2**	**11.8**	**1.8**
Land: buildings and other structures	0.0	0.8	0.0	0.4	0.2	1.7	4.2	4.0	1.6	0.3
Vehicles, plant, machinery, equipment	18.1	9.2	4.5	2.9	0.6	16.6	7.2	6.2	10.1	1.4
Current expenditure	**81.8**	**90.0**	**95.5**	**96.7**	**99.2**	**81.7**	**88.6**	**89.8**	**88.2**	**98.2**
Labour costs	17.0	32.4	24.1	34.4	33.9	68.6	50.1	49.4	59.8	60.8
Other current expenditure	64.9	57.6	71.4	62.4	65.2	13.1	38.6	40.5	28.5	37.4
Government research institutes	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Capital expenditure	**20.9**	**17.5**	**10.6**	**8.5**	**30.4**	**23.4**	**6.1**	**24.4**	**10.1**	**20.6**
Land: buildings and other structures	11.2	9.7	2.8	1.7	20.8	9.0	0.4	9.0	0.5	8.2
Vehicles, plant, machinery, equipment	9.7	7.9	7.8	6.8	9.7	14.5	5.7	15.4	9.6	12.3
Current expenditure	**79.1**	**82.5**	**89.4**	**91.5**	**69.6**	**76.6**	**93.9**	**75.6**	**89.9**	**79.4**
Labour costs	46.9	45.3	50.1	38.8	44.4	55.8	55.2	55.2	32.5	33.1
Other current expenditure	32.2	37.2	39.3	52.7	25.2	20.8	38.7	20.4	57.5	46.3
Museums	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Capital expenditure	**8.1**	**6.5**	**4.5**	**9.8**	**14.5**	**11.7**	**10.4**	**1.9**	**4.0**	**7.5**
Land: buildings and other structures	0.3	1.6	1.3	5.7	8.8	6.8	7.4	0.1	2.7	2.6
Vehicles, plant, machinery, equipment	7.8	4.8	3.3	4.1	5.7	4.9	2.9	1.8	1.3	4.9
Current expenditure	**91.9**	**93.5**	**95.5**	**90.2**	**85.5**	**88.3**	**89.6**	**98.1**	**96.0**	**92.5**
Labour costs	76.4	68.6	68.7	66.4	63.2	65.8	68.2	75.5	86.8	84.7
Other current expenditure	15.5	25.0	26.7	23.8	22.3	22.5	21.4	22.6	9.2	7.8
Government sector	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Capital expenditure	**17.9**	**11.8**	**8.7**	**7.6**	**20.1**	**18.4**	**9.2**	**17.7**	**10.9**	**15.4**
Land: buildings and other structures	5.7	3.9	1.7	1.4	12.1	6.1	2.2	5.8	1.4	5.7
Vehicles, plant, machinery, equipment	12.2	7.9	7.0	6.2	8.0	12.3	7.0	11.9	9.5	9.8
Current expenditure	**82.1**	**88.2**	**91.3**	**92.4**	**79.9**	**81.6**	**90.8**	**82.3**	**89.1**	**84.6**
Labour costs	36.9	41.9	40.2	42.1	45.3	61.1	56.5	56.1	46.9	44.2
Other current expenditure	45.2	46.3	51.1	50.3	34.6	20.5	34.4	26.2	42.2	40.3

Note: N/A indicates that data was not collected during those years.

Table C.97: Government sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	9 624	21 911	8 639	21 729	32 496	213 817	81 993	124 429	97 816	85 385
Nanotechnology	0	0	0	4 652	0	4 196	4 609	15 035	16 929	13 112
Total	**9 624**	**21 911**	**8 639**	**26 381**	**32 496**	**218 013**	**86 602**	**139 464**	**114 745**	**98 497**
Government expenditure on R&D	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**	**1 697 151**	**1 893 010**

Table C.98: Proportional government sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Biotechnology	1.1	2.1	0.7	1.9	3.0	21.1	6.6	8.7	5.8	4.5
Nanotechnology	0.0	0.0	0.0	0.4	0.0	0.4	0.4	1.0	1.0	0.7
Total	**1.1**	**2.1**	**0.7**	**2.3**	**3.0**	**21.6**	**7.0**	**9.7**	**6.8**	**5.2**

Table C.99: Government sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	109 774	170 304	194 564	232 090
Open source software	3	4	21 494	4 658	7 238	7 261	1 345	1 501	0	0
New materials	686	1 054	630	726	7 156	26 166	4 107	28 708	30 945	12 062
Tuberculosis (TB), HIV/AIDS, malaria	8 775	64 750	263	240	199 977	174 382	167 522	132 264	380 640	359 074
Total	**9 464**	**65 808**	**22 387**	**5 624**	**214 371**	**207 809**	**282 748**	**332 777**	**411 585**	**371 135**
Government expenditure on R&D	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**	**1 697 151**	**1 893 010**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.100: Proportional government sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	8.9	11.8	11.5	12.3
Open source software	0.0	0.0	1.9	0.4	0.7	0.7	0.1	0.1	0.0	0.0
New materials	0.1	0.1	0.1	0.1	0.7	2.6	0.3	2.0	1.8	0.6
Tuberculosis (TB), HIV/AIDS, malaria	1.0	6.3	0.0	0.0	18.7	17.2	13.6	9.2	22.4	19.0
Total	**1.1**	**6.4**	**1.9**	**0.5**	**20.1**	**20.5**	**22.9**	**23.1**	**24.3**	**19.6**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.101: Government sector R&D expenditure by research field (2003/04 to 2014/15)

MAIN RESEARCH FIELD	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**372 373**	**450 456**	**661 594**	**808 404**	**874 425**	**824 394**	**806 995**	**634 237**	**863 949**	**1 045 006**	**1 359 179**	**1 558 094**
Mathematical sciences	5 782	17 562	21 496	24 823	20 643	20 704	24 441	22 811	2 349	1 076	1 525	28 302
Physical sciences	0	8 256	27 205	24 726	45 052	45 804	12 093	0	0	5 064	0	30 154
Chemical sciences	493	8 709	10 711	16 622	22 672	17 009	21 698	10 653	1 223	21 823	19 394	61 881
Earth sciences	38 378	32 795	100 743	109 959	161 815	163 156	47 624	42 081	39 303	90 571	65 501	139 388
Information, computer and communication technologies	3 494	14 180	42 093	56 323	82 123	22 191	28 176	31 960	15 642	7 760	8 431	12 141
Applied sciences and technologies	16 758	4 581	17 328	31 603	15 286	15 852	9 315	4 154	10 183	32 467	23 216	29 723
Engineering sciences	116	9 663	10 355	26 008	14 164	11 487	14 996	4 165	4 515	10 430	11 853	13 176
Biological sciences	64 611	53 988	79 402	99 841	113 409	125 152	54 893	85 990	94 662	111 871	138 000	152 735
Agricultural sciences	141 460	174 756	156 538	170 347	208 662	200 598	274 781	225 441	362 241	460 921	397 687	506 445
Medical and health sciences	66 893	84 629	137 909	187 741	173 929	180 260	288 488	168 400	270 312	211 840	594 684	553 534
Environmental sciences	13 037	19 790	39 867	40 851	8 589	11 675	10 722	9 147	34 231	54 394	55 245	14 353
Material sciences	0	0	150	158	637	640	0	0	4 107	9 771	10 537	0
Marine sciences	21 352	21 547	17 797	19 402	7 445	9 866	19 768	29 434	25 182	27 019	33 106	16 262
Division 2: Social Sciences and Humanities	**92 994**	**64 875**	**183 047**	**212 951**	**279 974**	**315 282**	**260 308**	**377 103**	**371 720**	**392 503**	**337 972**	**334 916**
Social sciences	81 866	59 831	139 536	189 155	235 299	268 058	249 155	363 055	358 892	383 172	326 603	328 522
Humanities	11 128	5 044	43 511	23 796	44 676	47 225	11 152	14 048	12 828	9 331	11 369	6 394
Total	**465 367**	**515 331**	**844 641**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**	**1 697 151**	**1 893 010**

Table C.102: Proportional government sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**78.3**	**79.2**	**75.7**	**72.3**	**75.6**	**62.7**	**69.9**	**72.7**	**80.1**	**82.3**
Mathematical sciences	2.5	2.4	1.8	1.8	2.3	2.3	0.2	0.1	0.1	1.5
Physical sciences	3.2	2.4	3.9	4.0	1.1	0.0	0.0	0.4	0.0	1.6
Chemical sciences	1.3	1.6	2.0	1.5	2.0	1.1	0.1	1.5	1.1	3.3
Earth sciences	11.9	10.8	14.0	14.3	4.5	4.2	3.2	6.3	3.9	7.4
Information, computer and communication technologies	5.0	5.5	7.1	1.9	2.6	3.2	1.3	0.5	0.5	0.6
Applied sciences and technologies	2.1	3.1	1.3	1.4	0.9	0.4	0.8	2.3	1.4	1.6
Engineering sciences	1.2	2.5	1.2	1.0	1.4	0.4	0.4	0.7	0.7	0.7
Biological sciences	9.4	9.8	9.8	11.0	5.1	8.5	7.7	7.8	8.1	8.1
Agricultural sciences	18.5	16.7	18.1	17.6	25.7	22.3	29.3	32.1	23.4	26.8
Medical and health sciences	16.3	18.4	15.1	15.8	27.0	16.7	21.9	14.7	35.0	29.2
Environmental sciences	4.7	4.0	0.7	1.0	1.0	0.9	2.8	3.8	3.3	0.8
Material sciences	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.7	0.6	0.0
Marine sciences	2.1	1.9	0.6	0.9	1.9	2.9	2.0	1.9	2.0	0.9
Division 2: Social Sciences and Humanities	**21.7**	**20.8**	**24.3**	**27.7**	**24.4**	**37.3**	**30.1**	**27.3**	**19.9**	**17.7**
Social sciences	16.5	18.5	20.4	23.5	23.3	35.9	29.0	26.7	19.2	17.4
Humanities	5.2	2.3	3.9	4.1	1.0	1.4	1.0	0.6	0.7	0.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.103: Government sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**0**	**50 000**	**0**	**0**	**0**	**2 303**	**2 736**	**19 314**	**21 118**	**21 472**
Defence	0	50 000	0	0	0	2 303	2 736	19 314	21 118	21 472
Division 2: Economic Development	**322 819**	**350 497**	**429 646**	**373 251**	**438 114**	**500 343**	**469 129**	**480 373**	**510 688**	**763 932**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant production and plant primary products	54 523	45 951	79 290	66 503	63 570	64 400	70 754	100 956	89 446	107 672
Animal production and animal primary products	61 778	66 655	79 997	78 619	84 842	91 877	86 710	93 504	137 279	156 437
Mineral resources (excluding Energy)	0	0	0	0	0	0	0	0	311	5 403
Energy resources	0	0	0	0	0	37	0	0	1 023	12 062
Energy supply	8 095	8 905	14 290	12 387	2 522	6 154	10 552	7 193	8 482	34 845
Manufacturing	75	79	318	320	5 444	15 870	1 005	1 557	1 544	79 583
Construction	3 386	3 911	3 219	2 484	0	148	9 545	543	741	4 312
Transport	12 833	21 710	15 386	12 073	4 369	9 377	10 964	8 774	1 672	24 105
Information and communication services	39 357	32 858	69 318	11 965	13 244	44 257	20 590	5 678	5 515	14 397
Commercial services	4 686	4 908	6 897	2 405	9 957	7 471	4 708	3 587	12 162	15 532
Economic framework	74 563	76 965	98 537	105 080	161 326	187 931	157 364	161 541	116 604	167 690
Natural resources	63 524	88 558	62 394	81 415	92 838	72 820	96 938	97 042	135 909	141 895
Division 3: Society	**261 335**	**341 911**	**265 948**	**285 961**	**326 691**	**341 387**	**538 749**	**592 285**	**872 096**	**912 216**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	92 858	150 704	69 493	74 784	77 845	106 522	221 435	171 741	487 130	475 983
Education and training	97 773	112 042	111 407	127 907	158 579	42 234	69 185	116 788	165 906	174 540
Social development and community services	70 705	79 165	85 048	83 270	90 268	192 630	248 129	303 756	219 061	261 693
Division 4: Environment	**99 112**	**105 792**	**103 372**	**99 985**	**72 614**	**85 347**	**130 742**	**199 677**	**172 006**	**127 394**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental knowledge	67 106	74 710	71 734	83 429	45 360	40 610	83 089	137 679	124 445	91 677
Environmental aspects of development	8 995	8 112	20 797	12 424	18 153	27 635	38 467	51 795	38 877	27 206
Environmental and other aspects	23 011	22 970	10 841	4 132	9 101	17 102	9 186	10 204	8 684	8 511
Division 5: Advancement of Knowledge	**161 373**	**173 155**	**355 434**	**380 480**	**229 883**	**81 960**	**94 314**	**145 860**	**121 243**	**67 996**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural sciences, technologies and engineering	120 247	149 847	324 409	333 561	205 995	50 968	61 357	120 173	96 381	43 170
Social sciences and humanities	41 127	23 309	31 025	46 919	23 888	30 992	32 956	25 687	24 862	24 825
Total	**844 640**	**1 021 355**	**1 154 400**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**	**1 697 151**	**1 893 010**

Table C.104: Proportional government sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**0.0**	**4.9**	**0.0**	**0.0**	**0.0**	**0.2**	**0.2**	**1.3**	**1.2**	**1.1**
Defence	0.0	4.9	0.0	0.0	0.0	0.2	0.2	1.3	1.2	1.1
Division 2: Economic Development	**38.2**	**34.3**	**37.2**	**32.8**	**41.0**	**49.5**	**38.0**	**33.4**	**30.1**	**40.4**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	6.5	4.5	6.9	5.8	6.0	6.4	5.7	7.0	5.3	5.7
Animal production and animal primary products	7.3	6.5	6.9	6.9	7.9	9.1	7.0	6.5	8.1	8.3
Mineral resources (excluding Energy)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Energy resources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
Energy supply	1.0	0.9	1.2	1.1	0.2	0.6	0.9	0.5	0.5	1.8
Manufacturing	0.0	0.0	0.0	0.0	0.5	1.6	0.1	0.1	0.1	4.2
Construction	0.4	0.4	0.3	0.2	0.0	0.0	0.8	0.0	0.0	0.2
Transport	1.5	2.1	1.3	1.1	0.4	0.9	0.9	0.6	0.1	1.3
Information and communication services	4.7	3.2	6.0	1.0	1.2	4.4	1.7	0.4	0.3	0.8
Commercial services	0.6	0.5	0.6	0.2	0.9	0.7	0.4	0.2	0.7	0.8
Economic framework	8.8	7.5	8.5	9.2	15.1	18.6	12.7	11.2	6.9	8.9
Natural resources	7.5	8.7	5.4	7.1	8.7	7.2	7.8	6.8	8.0	7.5
Division 3: Society	**30.9**	**33.5**	**23.0**	**25.1**	**30.6**	**33.8**	**43.6**	**41.2**	**51.4**	**48.2**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	11.0	14.8	6.0	6.6	7.3	10.5	17.9	11.9	28.7	25.1
Education and training	11.6	11.0	9.7	11.2	14.9	4.2	5.6	8.1	9.8	9.2
Social development and community services	8.4	7.8	7.4	7.3	8.5	19.0	20.1	21.1	12.9	13.8
Division 4: Environment	**11.7**	**10.4**	**9.0**	**8.8**	**6.8**	**8.4**	**10.6**	**13.9**	**10.1**	**6.7**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	7.9	7.3	6.2	7.3	4.2	4.0	6.7	9.6	7.3	4.8
Environmental aspects of development	1.1	0.8	1.8	1.1	1.7	2.7	3.1	3.6	2.3	1.4
Environmental and other aspects	2.7	2.2	0.9	0.4	0.9	1.7	0.7	0.7	0.5	0.4
Division 5: Advancement of Knowledge	**19.1**	**17.0**	**30.8**	**33.4**	**21.5**	**8.1**	**7.6**	**10.1**	**7.1**	**3.6**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	14.2	14.7	28.1	29.3	19.3	5.0	5.0	8.4	5.7	2.3
Social sciences and humanities	4.9	2.3	2.7	4.1	2.2	3.1	2.7	1.8	1.5	1.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.105: Government sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	84 071	109 779	122 191	107 929	100 100	114 127	127 415	194 258	133 657	227 427
Free State	41 856	69 314	62 116	58 697	46 155	39 998	44 200	38 659	55 095	60 860
Gauteng	291 639	321 176	292 757	264 273	396 124	343 096	447 635	427 173	689 915	760 199
KwaZulu-Natal	72 131	84 192	76 458	115 302	54 914	48 056	126 857	168 029	161 962	177 517
Limpopo	15 917	31 118	40 217	55 252	60 421	57 797	65 017	74 621	95 668	83 683
Mpumalanga	36 001	50 568	74 690	39 103	68 796	69 980	78 335	80 201	77 479	93 566
North-West	20 857	32 889	42 500	70 741	29 176	43 048	44 618	45 573	73 576	56 719
Northern Cape	42 539	64 733	66 921	52 907	77 978	58 918	63 556	75 440	61 932	52 579
Western Cape	239 630	257 586	376 550	375 473	233 639	236 320	238 035	333 555	347 869	380 461
Total	**844 640**	**1 021 355**	**1 154 399**	**1 139 676**	**1 067 302**	**1 011 340**	**1 235 669**	**1 437 509**	**1 697 151**	**1 893 010**

Table C.106: Proportional government sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	10.0	10.7	10.6	9.5	9.4	11.3	10.3	13.5	7.9	12.0
Free State	5.0	6.8	5.4	5.2	4.3	4.0	3.6	2.7	3.2	3.2
Gauteng	34.5	31.4	25.4	23.2	37.1	33.9	36.2	29.7	40.7	40.2
KwaZulu-Natal	8.5	8.2	6.6	10.1	5.1	4.8	10.3	11.7	9.5	9.4
Limpopo	1.9	3.0	3.5	4.8	5.7	5.7	5.3	5.2	5.6	4.4
Mpumalanga	4.3	5.0	6.5	3.4	6.4	6.9	6.3	5.6	4.6	4.9
North-West	2.5	3.2	3.7	6.2	2.7	4.3	3.6	3.2	4.3	3.0
Northern Cape	5.0	6.3	5.8	4.6	7.3	5.8	5.1	5.2	3.6	2.8
Western Cape	28.4	25.2	32.6	32.9	21.9	23.4	19.3	23.2	20.5	20.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.107: Government sector R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2005/06	**2001**	874	495	632	1 483.0	650.6	353.3	479.1
2006/07	**2924**	1111	831	982	2 068.3	784.6	555.7	728.0
2007/08	**2794**	1138	739	917	1 950.0	757.6	495.6	696.9
2008/09	**2963**	1169	744	1050	2 073.9	805.0	495.2	773.7
2009/10	**2580**	986	509	1085	1 903.9	680.4	356.8	866.7
2010/11	**2704**	1184	421	1099	2 178.6	874.2	352.9	951.6
2011/12	**3143**	1411	432	1300	2 404.5	1 009.8	330.4	1 064.3
2012/13	**3252**	1409	517	1326	2 597.0	1 091.4	385.8	1 119.9
2013/14	**2874**	1229	518	1127	2 245.5	923.7	366.3	955.4
2014/15	**2893**	1343	550	1000	2 181.5	970.0	337.9	873.5

Table C.108: Government sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	1 409	696	713	1 091.4	600.0	491.4	77.5
Technicians directly supporting R&D	517	294	223	385.8	224.7	161.1	74.6
Other personnel directly supporting R&D	1 326	940	386	1 119.9	823.7	296.2	84.5
Total	**3 252**	**1 930**	**1 322**	**2 597.0**	**1 648.4**	**948.6**	**79.9**
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
Researchers	1 229	586	643	923.7	456.8	466.9	75.2
Technicians directly supporting R&D	518	280	238	366.3	206.0	160.3	70.7
Other personnel directly supporting R&D	1 127	746	381	955.4	650.8	304.7	84.8
Total	**2 874**	**1 612**	**1 262**	**2 245.5**	**1 313.6**	**931.9**	**78.1**
2014/15	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	%
Researchers	1 343	615	728	970.0	460.1	509.9	72.2
Technicians directly supporting R&D	550	298	252	337.9	200.1	137.8	61.4
Other personnel directly supporting R&D	1 000	680	320	873.5	617.6	255.9	87.3
Total	**2 893**	**1 593**	**1 300**	**2 181.5**	**1 277.8**	**903.6**	**75.4**

Table C.109: Government sector R&D personnel in headcounts by occupation, qualification, population group and gender (2014/15)

OCCUPATION AND QUALIFICATION		SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
	TOTAL	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	**1343**	**615**	**728**	**284**	**306**	**49**	**64**	**39**	**72**	**243**	**286**
Doctoral degree or equivalent	308	165	143	35	18	13	6	9	16	108	103
Masters, Honours, bachelor or equivalent	987	424	563	231	273	32	56	29	55	132	179
Diplomas	48	26	22	18	15	4	2	1	1	3	4
Technicians directly supporting R&D	**550**	**298**	**252**	**176**	**147**	**42**	**29**	**12**	**18**	**68**	**58**
Doctoral degree or equivalent	4	2	2	1	0	0	0	0	0	1	2
Masters, Honours, bachelor or equivalent	333	174	159	113	98	14	15	11	12	36	34
Diplomas	213	122	91	62	49	28	14	1	6	31	22
Other personnel directly supporting R&D	**1000**	**680**	**320**	**484**	**204**	**162**	**55**	**2**	**7**	**32**	**54**
Doctoral degree or equivalent	1	0	1	0	0	0	0	0	0	0	1
Masters, Honours, bachelor or equivalent	45	18	27	10	14	1	3	2	1	5	9
Diplomas	954	662	292	474	190	161	52	0	6	27	44
Total	2 893	1 593	1 300	944	657	253	148	53	97	343	398

C.2.4. Science councils sector

Table C.110: Science councils sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	522 861	647 191	804 731	776 406	776 505	871 635	900 830	937 826	970 785	1 166 491
Applied research	1 018 979	1 328 996	1 314 770	1 384 860	1 552 560	1 531 563	1 756 157	1 885 484	2 114 943	2 421 309
Experimental research	560 254	768 531	766 593	976 077	1 129 009	1 192 825	1 072 693	1 202 689	1 218 827	1 416 869
Total	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**	**4 304 556**	**5 004 669**

Table C.111: Proportional science councils sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Basic research	24.9	23.6	27.9	24.7	22.5	24.2	24.2	23.3	22.6	23.3
Applied research	48.5	48.4	45.6	44.1	44.9	42.6	47.1	46.8	49.1	48.4
Experimental research	26.7	28.0	26.6	31.1	32.6	33.2	28.8	29.9	28.3	28.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.112: Science councils sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	**209 013**	**212 625**	**205 857**	**383 927**	**452 801**	**291 830**	**323 070**	**275 750**	**323 190**	**598 429**
Land: buildings and other structures	76 528	53 713	30 704	61 063	107 455	56 141	65 442	68 565	71 602	362 246
Vehicles, plant, machinery, equipment	132 485	158 912	175 153	322 864	345 346	235 689	257 628	207 185	251 588	236 183
Current expenditure	**1 893 081**	**2 532 093**	**2 680 237**	**2 753 416**	**3 005 273**	**3 304 193**	**3 406 610**	**3 750 248**	**3 981 366**	**4 406 240**
Labour costs	875 467	1 162 633	1 250 480	1 283 210	1 413 128	1 293 033	1 531 460	2 053 204	2 187 401	1 986 918
Other current expenditure	1 017 614	1 369 460	1 429 757	1 470 206	1 592 145	2 011 160	1 875 150	1 697 044	1 793 965	2 419 322
Total	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**	**4 304 556**	**5 004 669**

Table C.113: Proportional science councils sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Capital expenditure	**9.9**	**7.7**	**7.1**	**12.2**	**13.1**	**8.1**	**8.7**	**6.8**	**7.5**	**12.0**
Land: buildings and other structures	3.6	2.0	1.1	1.9	3.1	1.6	1.8	1.7	1.7	7.2
Vehicles, plant, machinery, equipment	6.3	5.8	6.1	10.3	10.0	6.6	6.9	5.1	5.8	4.7
Current expenditure	**90.1**	**92.3**	**92.9**	**87.8**	**86.9**	**91.9**	**91.3**	**93.2**	**92.5**	**88.0**
Labour costs	41.6	42.4	43.3	40.9	40.9	36.0	41.1	51.0	50.8	39.7
Other current expenditure	48.4	49.9	49.5	46.9	46.0	55.9	50.3	42.2	41.7	48.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.114: Science councils sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	129 276	222 190	216 292	207 250	183 844	199 934	208 466	145 671	143 868	312 793
Nanotechnology	11 130	14 031	47 802	173 834	117 215	101 386	102 007	118 555	114 990	125 107
Total	**140 406**	**236 221**	**264 094**	**381 084**	**301 058**	**301 320**	**310 473**	**264 226**	**258 857**	**437 900**
Science councils expenditure on R&D	2 102 094	2 744 718	2 886 094	3 137 343	3 458 074	3 596 023	3 729 680	4 025 998	4 304 556	5 004 669

Table C.115: Proportional science councils sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Biotechnology	6.1	8.1	7.5	6.6	5.3	5.6	5.6	3.6	3.3	6.3
Nanotechnology	0.5	0.5	1.7	5.5	3.4	2.8	2.7	2.9	2.7	2.5
Total	**6.7**	**8.6**	**9.2**	**12.1**	**8.7**	**8.4**	**8.3**	**6.6**	**6.0**	**8.7**

Table C.116: Science councils sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	770 339	378 782	297 097	1 037 320
Open source software	6 035	27 510	77 885	67 833	15 013	7 228	15 982	36 636	0	389 871
New materials	40 343	82 990	64 131	157 134	94 304	201 071	197 430	751 305	229 854	358 361
Tuberculosis (TB), HIV/AIDS, malaria	170 000	180 104	233 917	490 982	333 841	386 948	399 070	455 311	398 880	346 751
Total	**216 378**	**290 604**	**375 933**	**715 949**	**443 158**	**595 247**	**1 382 821**	**1 622 034**	**925 831**	**2 132 304**
Science councils expenditure on R&D	2 102 094	2 744 718	2 886 094	3 137 343	3 458 074	3 596 023	3 729 680	4 025 998	4 304 556	5 004 669

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.117: Proportional science councils sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF INTEREST	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	20.7	9.4	6.9	20.7
Open source software	0.3	1.0	2.7	2.2	0.4	0.2	0.4	0.9	0.0	7.8
New materials	1.9	3.0	2.2	5.0	2.7	5.6	5.3	18.7	5.3	7.2
Tuberculosis (TB), HIV/AIDS, malaria	8.1	6.6	8.1	15.6	9.7	10.8	10.7	11.3	9.3	6.9
Total	10.3	10.6	13.0	22.8	12.8	16.6	37.1	40.3	21.5	42.6

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.118: Science councils sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**1 922 728**	**2 530 246**	**2 623 455**	**2 916 350**	**3 258 392**	**3 414 985**	**3 517 520**	**3 819 642**	**4 109 105**	**4 800 742**
Mathematical sciences	20 564	27 129	35 551	40 632	37 678	113 396	117 637	134 046	128 291	48 258
Physical sciences	114 723	126 542	93 583	115 737	87 221	97 922	120 267	123 267	129 568	263 302
Chemical sciences	21 494	33 774	37 430	44 271	49 462	8 074	20 972	14 078	18 166	63 775
Earth sciences	96 410	130 879	147 427	167 463	179 999	94 642	100 921	112 406	110 092	162 880
Information, computer and communication technologies	82 238	133 328	212 796	201 731	265 191	161 282	168 115	181 521	182 402	780 044
Applied sciences and technologies	78 065	126 107	138 849	139 267	153 830	924 104	954 616	1 092 098	1 046 934	277 649
Engineering sciences	451 924	642 923	643 349	863 084	947 315	365 980	278 125	292 940	349 666	1 001 486
Biological sciences	265 202	306 056	175 592	171 810	200 625	437 938	425 036	485 673	482 728	148 268
Agricultural sciences	387 569	521 454	566 561	442 060	647 750	479 449	582 438	594 638	859 600	1 075 165
Medical and health sciences	270 090	340 764	358 726	447 479	440 895	428 642	443 156	426 520	430 472	596 600
Environmental sciences	56 259	72 191	85 414	101 920	112 327	273 283	284 116	330 667	326 122	228 909
Material sciences	69 742	51 020	108 068	155 529	106 411	23 199	15 462	22 905	35 093	113 457
Marine sciences	8 448	18 078	20 108	25 368	29 689	7 073	6 656	8 885	9 970	40 949
Division 2: Social Sciences and Humanities	**179 366**	**214 472**	**262 639**	**220 993**	**199 682**	**181 038**	**212 160**	**206 356**	**195 452**	**203 927**
Social sciences	165 557	194 040	238 019	194 646	182 431	164 954	190 845	186 132	173 407	179 456
Humanities	13 809	20 432	24 620	26 347	17 250	16 084	21 315	20 224	22 044	24 471
Total	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**	**4 304 556**	**5 004 669**

Table C.119: Proportional science councils sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**91.5**	**92.2**	**90.9**	**93.0**	**94.2**	**95.0**	**94.3**	**94.9**	**95.5**	**95.9**
Mathematical sciences	1.0	1.0	1.2	1.3	1.1	3.2	3.2	3.3	3.0	1.0
Physical sciences	5.5	4.6	3.2	3.7	2.5	2.7	3.2	3.1	3.0	5.3
Chemical sciences	1.0	1.2	1.3	1.4	1.4	0.2	0.6	0.3	0.4	1.3
Earth sciences	4.6	4.8	5.1	5.3	5.2	2.6	2.7	2.8	2.6	3.3
Information, computer and communication technologies	3.9	4.9	7.4	6.4	7.7	4.5	4.5	4.5	4.2	15.6
Applied sciences and technologies	3.7	4.6	4.8	4.4	4.4	25.7	25.6	27.1	24.3	5.5
Engineering sciences	21.5	23.4	22.3	27.5	27.4	10.2	7.5	7.3	8.1	20.0
Biological sciences	12.6	11.2	6.1	5.5	5.8	12.2	11.4	12.1	11.2	3.0
Agricultural sciences	18.4	19.0	19.6	14.1	18.7	13.3	15.6	14.8	20.0	21.5
Medical and health sciences	12.8	12.4	12.4	14.3	12.7	11.9	11.9	10.6	10.0	11.9
Environmental sciences	2.7	2.6	3.0	3.2	3.2	7.6	7.6	8.2	7.6	4.6
Material sciences	3.3	1.9	3.7	5.0	3.1	0.6	0.4	0.6	0.8	2.3
Marine sciences	0.4	0.7	0.7	0.8	0.9	0.2	0.2	0.2	0.2	0.8
Division 2: Social Sciences and Humanities	**8.5**	**7.8**	**9.1**	**7.0**	**5.8**	**5.0**	**5.7**	**5.1**	**4.5**	**4.1**
Social sciences	7.9	7.1	8.2	6.2	5.3	4.6	5.1	4.6	4.0	3.6
Humanities	0.7	0.7	0.9	0.8	0.5	0.4	0.6	0.5	0.5	0.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.120: Science councils sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**155 066**	**260 354**	**228 603**	**280 219**	**311 288**	**228 376**	**243 083**	**279 989**	**262 203**	**762 464**
Defence	155 066	260 354	228 603	280 219	311 288	228 376	243 083	279 989	262 203	762 464
Division 2: Economic Development	**1 126 651**	**1 172 607**	**1 560 688**	**1 592 110**	**1 834 253**	**2 111 033**	**2 191 098**	**2 400 747**	**2 686 504**	**2 306 795**
Economic Development unclassified	0	0	0	0	0	0	0	0	0	0
Plant production and plant primary products	297 626	332 655	433 850	349 907	485 470	478 437	448 531	473 133	624 675	413 737
Animal production and animal primary products	72 380	115 649	25 124	18 760	27 043	25 193	280 542	287 431	419 259	269 519
Mineral resources (excluding Energy)	286 363	62 585	63 469	67 418	387 531	294 203	202 919	213 007	234 273	232 114
Energy resources	30 997	51 257	38 979	379 859	32 136	90 342	94 385	108 360	106 823	5 590
Energy supply	595	8 033	874	0	0	0	14 715	13 237	2 937	0
Manufacturing	110 467	130 396	385 822	225 227	262 443	366 380	351 021	400 864	393 152	88 746
Construction	90 143	149 809	101 232	116 781	129 922	222 124	220 595	256 024	245 333	31 034
Transport	18 401	30 943	33 817	41 260	45 848	0	0	0	0	0
Information and communication services	18 271	25 177	17 429	24 146	68 506	115 342	127 021	141 495	135 629	396 310
Commercial services	0	3 546	8 975	19 536	5 465	14 152	15 522	25 053	19 724	5 236
Economic framework	66 540	85 194	206 878	106 105	84 205	97 367	72 109	70 509	75 411	537 499
Natural resources	134 867	177 363	244 239	243 111	305 685	407 492	363 738	411 634	429 288	327 009
Division 3: Society	**278 222**	**359 982**	**368 010**	**418 385**	**453 428**	**388 244**	**430 876**	**413 060**	**425 943**	**801 370**
Society unclassified	0	0	0	0	0	0	0	0	0	0
Health	218 941	240 248	272 905	326 340	348 407	310 760	326 500	314 412	316 987	424 639
Education and training	51 704	56 054	37 449	50 525	65 761	50 676	68 852	64 941	72 216	335 946
Social development and community services	7 577	63 680	57 656	41 520	39 260	26 807	35 525	33 707	36 741	40 785
Division 4: Environment	**168 682**	**225 563**	**263 325**	**338 290**	**355 484**	**52 334**	**31 241**	**39 169**	**46 559**	**422 650**
Environment unclassified	0	0	0	0	0	0	0	0	0	0
Environmental knowledge	94 519	120 806	130 041	173 945	190 926	24 043	19 956	22 939	28 295	402 820
Environmental aspects of development	43 835	50 877	46 190	59 943	48 262	19 333	8 623	13 665	14 071	15 824
Environmental and other aspects	30 328	53 880	87 094	104 402	116 296	8 958	2 662	2 565	4 194	4 006
Division 5: Advancement of Knowledge	**373 473**	**726 212**	**465 468**	**508 339**	**503 621**	**816 035**	**833 382**	**893 033**	**883 346**	**711 390**
Advancement of Knowledge unclassified	0	0	0	0	0	0	0	0	0	0
Natural sciences, technologies and engineering	306 398	616 487	361 714	407 189	381 098	674 421	694 254	760 107	746 397	422 429
Social sciences and humanities	67 076	109 725	103 754	101 150	122 523	141 614	139 127	132 926	136 949	288 961
Total	**2102094**	**2744718**	**2886094**	**3137343**	**3458074**	**3596023**	**3729680**	**4 025 998**	**4 304 556**	**5 004 669**

Table C.121: Proportional science councils sector R&D expenditure by socio-economic objective (2004/05 to 2014/15)

SOCIO-ECONOMIC OBJECTIVE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**7.4**	**9.5**	**7.9**	**8.9**	**9.0**	**6.4**	**6.5**	**7.0**	**6.1**	**15.2**
Defence	7.4	9.5	7.9	8.9	9.0	6.4	6.5	7.0	6.1	15.2
Division 2: Economic Development	**53.6**	**42.7**	**54.1**	**50.7**	**53.0**	**58.7**	**58.7**	**59.6**	**62.4**	**46.1**
Economic Development unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	14.2	12.1	15.0	11.2	14.0	13.3	12.0	11.8	14.5	8.3
Animal production and animal primary products	3.4	4.2	0.9	0.6	0.8	0.7	7.5	7.1	9.7	5.4
Mineral resources (excluding Energy)	13.6	2.3	2.2	2.1	11.2	8.2	5.4	5.3	5.4	4.6
Energy resources	1.5	1.9	1.4	12.1	0.9	2.5	2.5	2.7	2.5	0.1
Energy supply	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.3	0.1	0.0
Manufacturing	5.3	4.8	13.4	7.2	7.6	10.2	9.4	10.0	9.1	1.8
Construction	4.3	5.5	3.5	3.7	3.8	6.2	5.9	6.4	5.7	0.6
Transport	0.9	1.1	1.2	1.3	1.3	0.0	0.0	0.0	0.0	0.0
Information and communication services	0.9	0.9	0.6	0.8	2.0	3.2	3.4	3.5	3.2	7.9
Commercial services	0.0	0.1	0.3	0.6	0.2	0.4	0.4	0.6	0.5	0.1
Economic framework	3.2	3.1	7.2	3.4	2.4	2.7	1.9	1.8	1.8	10.7
Natural resources	6.4	6.5	8.5	7.7	8.8	11.3	9.8	10.2	10.0	6.5
Division 3: Society	**13.2**	**13.1**	**12.8**	**13.3**	**13.1**	**10.8**	**11.6**	**10.3**	**9.9**	**16.0**
Society unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	10.4	8.8	9.5	10.4	10.1	8.6	8.8	7.8	7.4	8.5
Education and training	2.5	2.0	1.3	1.6	1.9	1.4	1.8	1.6	1.7	6.7
Social development and community services	0.4	2.3	2.0	1.3	1.1	0.7	1.0	0.8	0.9	0.8
Division 4: Environment	**8.0**	**8.2**	**9.1**	**10.8**	**10.3**	**1.5**	**0.8**	**1.0**	**1.1**	**8.4**
Environment unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	4.5	4.4	4.5	5.5	5.5	0.7	0.5	0.6	0.7	8.0
Environmental aspects of development	2.1	1.9	1.6	1.9	1.4	0.5	0.2	0.3	0.3	0.3
Environmental and other aspects	1.4	2.0	3.0	3.3	3.4	0.2	0.1	0.1	0.1	0.1
Division 5: Advancement of Knowledge	**17.8**	**26.5**	**16.1**	**16.2**	**14.6**	**22.7**	**22.3**	**22.2**	**20.5**	**14.2**
Advancement of Knowledge unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	14.6	22.5	12.5	13.0	11.0	18.8	18.6	18.9	17.3	8.4
Social sciences and humanities	3.2	4.0	3.6	3.2	3.5	3.9	3.7	3.3	3.2	5.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.122: Science councils sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	123 956	131 126	138 342	171 669	155 501	150 665	178 594	182 664	115 925	259 128
Free State	50 197	52 773	67 901	58 561	74 355	60 443	37 138	39 054	47 271	58 608
Gauteng	1 103 284	1 546 032	1 809 272	1 991 853	2 219 609	2 327 712	2 287 762	2 537 028	3 062 983	2 745 142
KwaZulu-Natal	201 811	267 620	201 009	231 033	235 432	249 137	292 246	307 302	239 387	484 142
Limpopo	48 058	69 808	67 562	63 455	78 662	66 250	99 104	105 150	7 286	117 270
Mpumalanga	48 051	69 859	66 333	55 547	66 881	55 690	100 476	103 468	62 349	124 613
North-West	45 751	72 968	49 390	41 541	51 295	42 854	104 139	110 361	39 615	153 911
Northern Cape	64 284	55 676	45 250	43 624	35 253	64 774	81 998	78 714	122 454	148 387
Western Cape	416 702	478 856	441 036	480 059	541 086	578 497	548 223	562 256	607 285	913 468
Total	**2 102 094**	**2 744 718**	**2 886 094**	**3 137 343**	**3 458 074**	**3 596 023**	**3 729 680**	**4 025 998**	**4 304 556**	**5 004 669**

Table C.123: Proportional science councils sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	5.9	4.8	4.8	5.5	4.5	4.2	4.8	4.5	2.7	5.2
Free State	2.4	1.9	2.4	1.9	2.2	1.7	1.0	1.0	1.1	1.2
Gauteng	52.5	56.3	62.7	63.5	64.2	64.7	61.3	63.0	71.2	54.9
KwaZulu-Natal	9.6	9.8	7.0	7.4	6.8	6.9	7.8	7.6	5.6	9.7
Limpopo	2.3	2.5	2.3	2.0	2.3	1.8	2.7	2.6	0.2	2.3
Mpumalanga	2.3	2.5	2.3	1.8	1.9	1.5	2.7	2.6	1.4	2.5
North-West	2.2	2.7	1.7	1.3	1.5	1.2	2.8	2.7	0.9	3.1
Northern Cape	3.1	2.0	1.6	1.4	1.0	1.8	2.2	2.0	2.8	3.0
Western Cape	19.8	17.4	15.3	15.3	15.6	16.1	14.7	14.0	14.1	18.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.124: Science councils sector R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	HEADCOUNTS				FULL TME EQUIVALENTS			
	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS	TECHNICIANS	OTHER R&D PERSONNEL
2005/06	**5 679**	1 790	1 678	2 211	4 103.1	1 323.3	1 250.9	1 529.0
2006/07	**5 798**	2 255	1 570	1 973	4 956.1	1 982.7	1 342.1	1 631.3
2007/08	**5 988**	2 594	1 351	2 043	5 058.8	2 300.2	1 099.2	1 659.4
2008/09	**5 609**	2 648	1 302	1 659	4 699.9	2 246.7	1 119.1	1 334.0
2009/10	**5 926**	2 669	1 381	1 876	4 782.7	2 251.5	1 179.4	1 351.8
2010/11	**4 923**	1 941	1 336	1 646	4 312.4	1 777.3	1 155.5	1 379.6
2011/12	**4 494**	1 803	1 333	1 358	3 803.5	1 634.9	1 172.4	996.1
2012/13	**5 399**	1 879	1 403	2 117	4 748.5	1 697.1	1 279.6	1 771.8
2013/14	**5 884**	1 956	1 396	2 532	5 164.5	1 781.3	1 247.3	2 136.0
2014/15	**4 836**	1 988	1 857	991	4 180.4	1 765.4	1 686.2	728.9

Table C.125: Science councils sector R&D personnel in headcounts and full-time equivalents by occupation and gender (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE		MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	1 879	1 018	861	1 697.1	904.5	792.6	90.3
Technicians directly supporting R&D	1 403	830	573	1 279.6	734.7	544.9	91.2
Other personnel directly supporting R&D	2 117	1 094	1 023	1 771.8	866.9	904.9	83.7
Total	5 399	2 942	2 457	4 748.5	2 506.1	2 242.4	88.0
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	1 956	1 101	855	1 781.3	993.8	787.5	91.1
Technicians directly supporting R&D	1 396	814	582	1 247.3	724.9	522.4	89.3
Other personnel directly supporting R&D	2 532	1 308	1 224	2 136.0	1 034.2	1 101.8	84.4
Total	5 884	3 223	2 661	5 164.5	2 752.8	2 411.7	87.8
2014/15	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers	1 988	1 154	834	1 765.4	1 016.5	748.9	88.8
Technicians directly supporting R&D	1 857	1 077	780	1 686.2	959.9	726.3	90.8
Other personnel directly supporting R&D	991	564	427	728.9	364.7	364.2	73.6
Total	**4 836**	**2 795**	**2 041**	**4 180.4**	**2 341.1**	**1 839.4**	**86.4**

Table C.126: Science councils sector R&D personnel in headcounts by occupation, qualification, population group and gender (2014/15)

OCCUPATION AND QUALIFICATION	TOTAL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers	**1 988**	**1 154**	**834**	**496**	**321**	**61**	**62**	**77**	**98**	**520**	**353**
Doctoral degree or equivalent	826	528	298	213	81	27	23	31	34	257	160
Masters, honours, bachelor or equivalent	1 034	551	483	245	207	28	37	45	59	233	180
Diplomas	128	75	53	38	33	6	2	1	5	30	13
Personnel directly supporting R&D	**1 857**	**1 077**	**780**	**555**	**453**	**84**	**34**	**57**	**82**	**381**	**211**
Doctoral degree or equivalent	47	39	8	6	1	0	0	3	3	30	4
Masters, honours, bachelor or equivalent	961	508	453	233	246	25	20	45	61	205	126
Diplomas	849	530	319	316	206	59	14	9	18	146	81
Other personnel directly supporting R&D	**991**	**564**	**427**	**405**	**238**	**45**	**71**	**36**	**36**	**78**	**82**
Doctoral degree or equivalent	14	10	4	6	1	2	1	0	0	2	2
Masters, honours, bachelor or equivalent	424	206	218	114	125	14	15	25	28	53	50
Diplomas	553	348	205	285	112	29	55	11	8	23	30
Total	**4 836**	**2 795**	**2 041**	**1 456**	**1 012**	**190**	**167**	**170**	**216**	**979**	**646**

Table C.127: Science councils sector overview (2013/14 and 2014/15)

SCIENCE COUNCILS	2013/14				2014/15			
	R&D EXPENDITURE	RESEARCHERS	BASIC RESEARCH	CAPITAL EXPENDITURE	R&D EXPENDITURE	RESEARCHERS	BASIC RESEARCH	CAPITAL EXPENDITURE
	R'000	FTEs	R'000	R'000	R'000	FTEs	R'000	R'000
African Institute of South Africa	11 748	16.0	8 224	802	0	0.0	0	0
Agricultural Research Council	1 008 401	466.0	131 092	119 384	1 034 342	472.0	206 868	111 103
Council for Scientific and Industrial Research	2 007 913	561.0	200 791	115 075	2 198 138	622.0	219 814	209 682
Council for Geoscience	109 577	75.0	87 662	17 210	130 903	81.0	26 181	31 113
Human Science Research Council	244 938	176.0	61 235	2 397	271 903	98.4	54 381	4 416
Medical Research Council	390 820	220.0	234 492	11 728	544 480	208.0	326 688	7 783
Mintek	281 883	137.0	76 108	18 739	288 189	136.2	89 338	23 556
National Research Foundation	249 276	130.0	171 182	37 855	536 714	147.8	243 221	210 776
Total	**4 304 556**	**1 781.0**	**970 785**	**323 190**	**5 004 669**	**1 765.4**	**1 166 491**	**598 429**

C.2.5. Higher education sector

Table C.128: Higher education sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Basic research	1 134 411	1 348 299	1 709 334	1 965 121	2 459 733	2 634 722	3 290 328	3 843 906	3 785 149	4 601 453
Applied research	1 045 483	1 282 627	1 262 425	1 468 624	1 729 496	1 890 185	2 279 175	2 390 090	2 412 316	2 649 558
Experimental research	552 321	667 882	650 102	757 621	911 994	899 695	1 039 712	1 099 157	1 095 388	1 126 565
Total	**2 732 215**	**3 298 808**	**3 621 861**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**	**7 292 853**	**8 377 575**

Table C.129: Proportional higher education sector R&D expenditure by type of research (2005/06 to 2014/15)

TYPE OF RESEARCH	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Basic research	41.5	40.9	47.2	46.9	48.2	48.6	49.8	52.4	51.9	54.9
Applied research	38.3	38.9	34.9	35.0	33.9	34.8	34.5	32.6	33.1	31.6
Experimental research	20.2	20.2	17.9	18.1	17.9	16.6	15.7	15.0	15.0	13.4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.130: Higher education sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Capital expenditure	**150 224**	**216 037**	**295 813**	**281 193**	**376 057**	**393 758**	**564 179**	**602 116**	**706 336**	**779 789**
Land: buildings and other structures	21 622	69 123	51 734	38 564	97 533	146 602.0	137 530.0	192 324.0	256 114.0	200 253.0
Vehicles, plant, machinery, equipment	128602	146 914	244 079	242 629	278 524.0	247156	426 649.0	409 792.0	450 222.0	579 536.0
Current expenditure	**2 581 991**	**3 082 771**	**3 326 049**	**3 910 173**	**4 725 167**	**5 030 844**	**6 045 037**	**6 731 037**	**6 586 517**	**7 597 786**
Labour costs	1 202 172	1 376 395	1 466 379	1 504 542	1 710 183	1 883 176.0	2 481 322.0	2 996 929.0	3 248 542.0	3 539 733.2
Total cost of R&D postgraduate students	313 645	438 486	495 128	532 883	581 140	756 930.0	1 074 207.0	1 186 653.0	1 224 611.0	1 579 088.0
Other current expenditure	1 066 174	1 267 890	1 364 542	1 872 748	2 433 844	2 390 738	2 489 508	2 547 455	2 113 364	2 478 965
Total	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**	**7 292 853**	**8 377 575**

Table C.131: Proportional higher education sector R&D expenditure by accounting category (2005/06 to 2014/15)

TYPE OF EXPENDITURE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	R'000
Capital expenditure	**5.5**	**6.5**	**8.2**	**6.7**	**7.4**	**7.3**	**8.5**	**8.2**	**9.7**	**9.3**
Land: buildings and other structures	0.8	2.1	1.4	0.9	1.9	2.7	2.1	2.6	3.5	2.4
Vehicles, plant, machinery, equipment	4.7	4.5	6.7	5.8	5.5	4.6	6.5	5.6	6.2	6.9
Current expenditure	**94.5**	**93.5**	**91.8**	**93.3**	**92.6**	**92.7**	**91.5**	**91.8**	**90.3**	**90.7**
Labour costs	44.0	41.7	40.5	35.9	33.5	34.7	37.5	40.9	44.5	42.3
Total cost of R&D postgraduate students	11.5	13.3	13.7	12.7	11.4	14.0	16.3	16.2	16.8	18.8
Other current expenditure	39.0	38.4	37.7	44.7	47.7	44.1	37.7	34.7	29.0	29.6
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.132: Higher education sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Biotechnology	176 818	215 606	253 872	303 483	366 900	381 225	344 039	380 727	406 285	470 837
Nanotechnology	85 162	140 998	170 405	153 013	156 176	204 802	317 649	293 300	356 826	393 137
Total	**261 980**	**356 604**	**424 277**	**456 496**	**523 076**	**586 027**	**661 688**	**674 028**	**763 111**	**863 974**
Higher Education expenditure on R&D	2 732 215	3 298 808	3 621 862	4 191 366	5 101 224	5 424 602	6 609 216	7 333 153	7 292 853	8 377 575

Table C.133: Proportional higher education sector expenditure on multidisciplinary areas of R&D (2005/06 to 2014/15)

MULTIDISCIPLINARY AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Biotechnology	6.5	6.5	7.0	7.2	7.2	7.0	5.2	5.2	5.6	5.6
Nanotechnology	3.1	4.3	4.7	3.7	3.1	3.8	4.8	4.0	4.9	4.7
Total	**9.6**	**10.8**	**11.7**	**10.9**	**10.3**	**10.8**	**10.0**	**9.2**	**10.5**	**10.3**

Table C.134: Higher education sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	770 339	300 006	340 386	499 958
Open source software	27 723	41 441	41 234	49 532	58 643	75 195	15 982	85 508	105 008	117 646
New materials	106 912	135 803	160 993	202 242	283 711	266 419	197 430	321 744	381 136	436 975
Tuberculosis (TB), HIV/AIDS, malaria	276 591	391 002	583 726	650 502	815 431	845 216	399 070	714 966	794 810	845 245
Total	**411 226**	**568 246**	**785 953**	**902 276**	**1 157 785**	**1 186 830**	**1 382 821**	**1 422 224**	**1 621 339**	**1 899 823**
Higher Education expenditure on R&D	2 732 215	3 298 808	3 621 862	4 191 366	5 101 224	5 424 602	6 609 216	7 333 153	7 292 853	8 377 575

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.135: Proportional higher education sector R&D expenditure on selected areas of interest (2005/06 to 2014/15)

SELECTED AREA OF R&D	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Environment related	N/A	N/A	N/A	N/A	N/A	N/A	11.7	4.1	4.7	6.0
Open source software	1.0	1.3	1.1	1.2	1.1	1.4	0.2	1.2	1.4	1.4
New materials	3.9	4.1	4.4	4.8	5.6	4.9	3.0	4.4	5.2	5.2
Tuberculosis (TB), HIV/AIDS, malaria	10.1	11.9	16.1	15.5	16.0	15.6	6.0	9.7	10.9	10.1
Total	**15.1**	**17.2**	**21.7**	**21.5**	**22.7**	**21.9**	**20.9**	**19.4**	**22.2**	**22.7**

N/A: Environment-related data were collected from the 2011/12 R&D survey onwards.

Table C.136: Higher education sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Natural Sciences, Technology and Engineering	**1 846 022**	**2 294 479**	**2 389 525**	**2 703 975**	**3 374 024**	**3 558 265**	**4 486 057**	**5 045 892**	**4 925 713**	**5 704 150**
Mathematical sciences	79 707	104 323	109 354	151 880	168 689	283 942	311 572	342 093	278 183	333 587
Physical sciences	97 252	121 559	146 726	135 002	352 628	175 110	189 341	193 849	198 735	230 826
Chemical sciences	117 914	106 214	143 897	136 528	161 856	158 775	317 389	444 258	286 511	326 992
Earth sciences	115 680	119 682	121 419	136 955	84 777	157 781	174 141	190 744	207 261	260 862
Information, computer and communication technologies	105 873	143 037	119 600	125 413	121 750	112 985	186 870	232 090	192 911	245 257
Applied sciences and technologies	55 779	101 400	96 972	78 904	306 195	90 761	245 611	251 278	280 310	274 283
Engineering sciences	268 250	349 889	294 630	352 114	305 953	461 980	741 462	768 810	855 529	918 494
Biological sciences	195 380	230 480	271 216	282 280	349 343	593 219	610 408	731 389	721 229	825 432
Agricultural sciences	143 104	151 950	159 793	192 265	179 309	205 311	268 834	276 857	311 355	354 949
Medical and health sciences	582 798	710 386	785 630	966 365	1 195 597	1 226 127	1 245 284	1 391 838	1 339 755	1 641 683
Environmental sciences	42 719	58 256	58 793	68 869	52 431	60 458	111 612	147 367	166 493	180 324
Material sciences	29 348	86 764	72 484	68 467	76 732	26 629	81 749	68 849	82 479	100 358
Marine sciences	12 220	10 539	9 013	8 933	18 764	5 186	1 783	6 469	4 961	11 105
Division 2: Social Sciences and Humanities	**886 193**	**1 004 329**	**1 232 337**	**1 487 391**	**1 727 200**	**1 866 337**	**2 123 159**	**2 287 261**	**2 367 140**	**2 673 425**
Social sciences	594 579	658 419	796 281	967 204	1 273 479	1 433 610	1 664 653	1 844 744	1 825 026	2 056 555
Humanities	291 615	345 910	436 056	520 187	453 721	432 727	458 505	442 517	542 114	616 870
Total	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**	**7 292 853**	**8 377 575**

Table C.137: Proportional higher education sector R&D expenditure by research field (2005/06 to 2014/15)

MAIN RESEARCH FIELD	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Natural Sciences, Technology and Engineering	**67.6**	**69.6**	**66.0**	**64.5**	**66.1**	**65.6**	**67.9**	**68.8**	**67.5**	**68.1**
Mathematical sciences	2.9	3.2	3.0	3.6	3.3	5.2	4.7	4.7	3.8	4.0
Physical sciences	3.6	3.7	4.1	3.2	6.9	3.2	2.9	2.6	2.7	2.8
Chemical sciences	4.3	3.2	4.0	3.3	3.2	2.9	4.8	6.1	3.9	3.9
Earth sciences	4.2	3.6	3.4	3.3	1.7	2.9	2.6	2.6	2.8	3.1
Information, computer and communication technologies	3.9	4.3	3.3	3.0	2.4	2.1	2.8	3.2	2.6	2.9
Applied sciences and technologies	2.0	3.1	2.7	1.9	6.0	1.7	3.7	3.4	3.8	3.3
Engineering sciences	9.8	10.6	8.1	8.4	6.0	8.5	11.2	10.5	11.7	11.0
Biological sciences	7.2	7.0	7.5	6.7	6.8	10.9	9.2	10.0	9.9	9.9
Agricultural sciences	5.2	4.6	4.4	4.6	3.5	3.8	4.1	3.8	4.3	4.2
Medical and health sciences	21.3	21.5	21.7	23.1	23.4	22.6	18.8	19.0	18.4	19.6
Environmental sciences	1.6	1.8	1.6	1.6	1.0	1.1	1.7	2.0	2.3	2.2
Material sciences	1.1	2.6	2.0	1.6	1.5	0.5	1.2	0.9	1.1	1.2
Marine sciences	0.4	0.3	0.2	0.2	0.4	0.1	0.0	0.1	0.1	0.1
Division 2: Social Sciences and Humanities	**32.4**	**30.4**	**34.0**	**35.5**	**33.9**	**34.4**	**32.1**	**31.2**	**32.5**	**31.9**
Social sciences	21.8	20.0	22.0	23.1	25.0	26.4	25.2	25.2	25.0	24.5
Humanities	10.7	10.5	12.0	12.4	8.9	8.0	6.9	6.0	7.4	7.4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100.0**	**100.0**	**100.0**	**100.0**

Table C.138: Higher education sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVES	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Division 1: Defence	**2 423**	**2 711**	**4 328**	**5 150**	**3 620**	**7 271**	**10 211**	**12 009**	**6 121**	**7 266**
Defence	2 423	2 711	4 328	5 150	3 620	7 271	10 211	12 009	6 121	7 266
Division 2: Economic development	**923 990**	**1 199 956**	**1 271 620**	**1 539 534**	**1 738 239**	**1 542 453**	**2 072 624**	**1 996 497**	**2 547 254**	**2 472 831**
Economic development unclassified	115 029	150 668	171 520	209 400	0	0	0	0	0	0
Plant production and plant primary products	91 790	119 949	123 126	153 054	178 033	188 513	277 764	234 309	534 417	220 024
Animal production and primary products	75 076	85 256	95 219	117 255	130 828	128 705	151 334	176 645	173 865	190 421
Mineral resources (excluding energy)	48 914	89 559	74 725	88 576	83 294	99 966	129 185	69 062	129 459	127 236
Energy resources	21 461	51 923	84 459	71 648	81 689	88 657	87 659	92 947	82 011	75 367
Energy supply	58 314	90 365	96 209	106 457	107 759	144 462	157 304	162 879	221 160	233 075
Manufacturing	145 485	210 910	172 947	210 009	297 303	245 037	272 287	348 845	340 630	329 083
Construction	20 407	27 521	28 313	46 175	23 858	73 340	116 141	74 322	79 775	96 642
Transport	16 440	16 447	22 770	29 517	30 456	24 045	53 043	31 830	32 503	38 549
Information and communication services	71 439	80 322	67 026	87 013	110 589	93 281	144 313	101 980	139 305	152 987
Commercial services	47 260	41 037	93 285	54 604	282 078	54 659	106 287	111 587	156 001	124 971
Economic framework	115 993	133 600	164 759	193 599	206 625	217 501	302 693	335 217	363 483	493 154
Natural resources	96 382	102 399	77 260	172 228	205 728	184 287	274 612	256 874	294 645	391 322
Division 3: Society	**831 632**	**1 062 182**	**1 149 091**	**1 359 797**	**1 177 651**	**1 393 700**	**1 583 800**	**1 865 914**	**1 569 371**	**2 180 662**
Society unclassified	115 029	150 668	171 520	209 400	0	0	0	0	0	0
Health	422 804	507 767	556 914	644 763	701 007	776 688	686 152	1 150 349	654 525	1 074 951
Education and training	149 270	199 056	195 917	227 502	187 291	294 482	359 897	402 285	547 108	739 611
Social development and community services	144 529	204 691	224 740	278 132	289 353	322 530	537 752	313 280	367 738	366 099
Division 4: Environment	**223 302**	**261 464**	**317 863**	**339 148**	**346 483**	**377 151**	**509 533**	**554 758**	**456 619**	**629 133**
Environment unclassified	38 343	50 223	57 173	69 800	0	0	0	0	0	0
Environmental knowledge	107 922	112 319	108 189	135 472	170 901	188 250	230 135	232 440	184 169	269 688
Environmental aspects of development	37 006	42 619	93 853	72 050	92 353	86 295	123 344	168 956	154 462	202 787
Environmental and other aspects	40 030	56 303	58 648	61 826	83 229	102 606	156 054	153 362	117 989	156 658
Division 5: Advancement of knowledge	**750 868**	**772 495**	**878 959**	**947 737**	**1 835 231**	**2 104 026**	**2 433 048**	**2 903 975**	**2 713 487**	**3 087 684**
Advancement of knowledge unclassified	115 029	150 668	171 520	209 400	0	0	0	0	0	0
Natural sciences, technologies and engineering	297 837	329 497	416 081	423 469	969 079	1 263 802	1 443 913	1 731 540	1 633 257	2 006 195
Social sciences and humanities	338 002	292 330	291 359	314 868	866 152	840 223	989 135	1 172 435	1 080 231	1 081 488
Total	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**	**7 292 853**	**8 377 575**

Table C.139: Proportional higher education sector R&D expenditure by socio-economic objective (2005/06 to 2014/15)

SOCIO-ECONOMIC OBJECTIVES	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Division 1: Defence	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**	**0.1**	**0.1**
Defence	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1
Division 2: Economic development	**33.8**	**36.4**	**35.1**	**36.7**	**34.1**	**28.4**	**31.4**	**27.2**	**34.9**	**29.5**
Economic development unclassified	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant production and plant primary products	3.4	3.6	3.4	3.7	3.5	3.5	4.2	3.2	7.3	2.6
Animal production & primary products	2.7	2.6	2.6	2.8	2.6	2.4	2.3	2.4	2.4	2.3
Mineral resources (excluding energy)	1.8	2.7	2.1	2.1	1.6	1.8	2.0	0.9	1.8	1.5
Energy resources	0.8	1.6	2.3	1.7	1.6	1.6	1.3	1.3	1.1	0.9
Energy supply	2.1	2.7	2.7	2.5	2.1	2.7	2.4	2.2	3.0	2.8
Manufacturing	5.3	6.4	4.8	5.0	5.8	4.5	4.1	4.8	4.7	3.9
Construction	0.7	0.8	0.8	1.1	0.5	1.4	1.8	1.0	1.1	1.2
Transport	0.6	0.5	0.6	0.7	0.6	0.4	0.8	0.4	0.4	0.5
Information and communication services	2.6	2.4	1.9	2.1	2.2	1.7	2.2	1.4	1.9	1.8
Commercial services	1.7	1.2	2.6	1.3	5.5	1.0	1.6	1.5	2.1	1.5
Economic framework	4.2	4.0	4.5	4.6	4.1	4.0	4.6	4.6	5.0	5.9
Natural resources	3.5	3.1	2.1	4.1	4.0	3.4	4.2	3.5	4.0	4.7
Division 3: Society	**30.4**	**32.2**	**31.7**	**32.4**	**23.1**	**25.7**	**24.0**	**25.4**	**21.5**	**26.0**
Society unclassified	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	15.5	15.4	15.4	15.4	13.7	14.3	10.4	15.7	9.0	12.8
Education and training	5.5	6.0	5.4	5.4	3.7	5.4	5.4	5.5	7.5	8.8
Social development and community services	5.3	6.2	6.2	6.6	5.7	5.9	8.1	4.3	5.0	4.4
Division 4: Environment	**8.2**	**7.9**	**8.8**	**8.1**	**6.8**	**7.0**	**7.7**	**7.6**	**6.3**	**7.5**
Environment unclassified	1.4	1.5	1.6	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Environmental knowledge	3.9	3.4	3.0	3.2	3.4	3.5	3.5	3.2	2.5	3.2
Environmental aspects of development	1.4	1.3	2.6	1.7	1.8	1.6	1.9	2.3	2.1	2.4
Environmental and other aspects	1.5	1.7	1.6	1.5	1.6	1.9	2.4	2.1	1.6	1.9
Division 5: Advancement of knowledge	**27.5**	**23.4**	**24.3**	**22.6**	**36.0**	**38.8**	**36.8**	**39.6**	**37.2**	**36.9**
Advancement of knowledge unclassified	4.2	4.6	4.7	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural sciences, technologies and engineering	10.9	10.0	11.5	10.1	19.0	23.3	21.8	23.6	22.4	23.9
Social sciences and humanities	12.4	8.9	8.0	7.5	17.0	15.5	15.0	16.0	14.8	12.9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.140: Higher education sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Eastern Cape	214 701	259 254	276 740	286 605	536 792	556 496	608 815	592 861	557 292	612 239
Free State	146 823	155 326	180 713	226 892	246 298	281 889	323 335	356 177	449 852	491 203
Gauteng	1 030 801	1 214 575	1 260 991	1 467 914	1 537 166	1 600 783	2 028 145	2 118 817	2 233 696	2 733 330
KwaZulu-Natal	379 681	451 992	459 299	567 999	662 518	677 740	902 386	1 137 258	750 507	843 111
Limpopo	43 565	63 233	79 716	86 635	147 397	224 603	349 559	300 435	187 317	216 352
Mpumalanga	58 548	67 029	105 629	72 590	88 680	119 231	170 966	182 192	147 134	174 657
North-West	73 456	97 246	166 137	150 125	190 570	184 514	275 088	311 325	405 963	404 575
Northern Cape	15 263	42 944	48 277	68 443	92 062	107 581	148 425	164 483	161 603	146 769
Western Cape	769 377	947 209	1 044 360	1 264 162	1 599 741	1 671 766	1 802 496	2 169 606	2 399 489	2 755 339
Total	**2 732 215**	**3 298 808**	**3 621 862**	**4 191 366**	**5 101 224**	**5 424 602**	**6 609 216**	**7 333 153**	**7 292 853**	**8 377 575**

Table C.141: Proportional higher education sector R&D expenditure by province (2005/06 to 2014/15)

PROVINCE	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
	%	%	%	%	%	%	%	%	%	%
Eastern Cape	7.9	7.9	7.6	6.8	10.5	10.3	9.2	8.1	7.6	7.3
Free State	5.4	4.7	5	5.4	4.8	5.2	4.9	4.9	6.2	5.9
Gauteng	37.7	36.8	34.8	35	30.1	29.5	30.7	28.9	30.6	32.6
KwaZulu-Natal	13.9	13.7	12.7	13.6	13	12.5	13.7	15.5	10.3	10.1
Limpopo	1.6	1.9	2.2	2.1	2.9	4.1	5.3	4.1	2.6	2.6
Mpumalanga	2.1	2	2.9	1.7	1.7	2.2	2.6	2.5	2.0	2.1
North-West	2.7	2.9	4.6	3.6	3.7	3.4	4.2	4.2	5.6	4.8
Northern Cape	0.6	1.3	1.3	1.6	1.8	2.0	2.2	2.2	2.2	1.8
Western Cape	28.2	28.7	28.8	30.2	31.4	30.8	27.3	29.6	32.9	32.9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table C.142: Higher education sector R&D personnel in headcounts and full-time equivalents by occupation (2005/06 to 2014/15)

YEAR	HEADCOUNTS				FULL-TME EQUIVALENTS			
	TOTAL	RESEARCHERS*	TECHNICIANS	OTHER R&D PERSONNEL	TOTAL	RESEARCHERS*	TECHNICIANS	OTHER R&D PERSONNEL
2005/06	**22 787**	18 877	1 925	1 985	4 931.6	3 555.2	535.0	841.4
2006/07	**21 746**	17 459	2 170	2 117	5 168.9	3 657.8	643.8	867.3
2007/08	**21 365**	17 008	2 006	2 351	5 178.1	3 672.3	612.8	893.0
2008/09	**20 223**	16 313	2 054	1 856	4 859.3	3 643.5	541.7	674.2
2009/10	**20 850**	17 010	2 115	1 725	5 018.0	3 761.8	579.8	676.4
2010/11	**19 970**	15 553	2 123	2 294	5 023.0	3 613.7	534.9	874.5
2011/12	**21 458**	16 294	2 344	2 820	6 091.2	4 355.3	673.4	1 062.5
2012/13	**22 691**	17 441	2 344	2 906	6 571.5	4 700.6	737.3	1 133.5
2013/14	**23 543**	18 212	2 284	3 047	7 005.7	5 000.5	843.7	1 161.5
2014/15	**24 701**	18 625	2 496	3 580	7 237.8	5 097.7	857.3	1 282.8

*Excludes doctoral students and post-doctoral fellows.

Table C.143: Higher education sector R&D personnel (including doctoral students and post-doctoral fellows) in headcounts and full-time equivalents by occupation and gender (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)			
2012/13	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	32 955	18 193	14 762	13 743.6	7 612.6	6 131.0	41.7
Technicians	2 344	1 346	998	737.3	428.8	308.6	31.5
Other personnel	2 906	899	2 007	1 133.5	349.4	784.1	39.0
Total	**38 205**	**20 438**	**17 767**	**15 614.4**	**8 390.8**	**7 223.6**	**40.9**
2013/14	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	36 133	19 920	16 213	15 772.5	8 825.3	6 947.2	43.7
Technicians directly supporting R&D	2 284	1 314	970	843.7	465.1	378.6	36.9
Other personnel directly supporting R&D	3 047	989	2 058	1 161.5	367.8	793.7	38.1
Total	**41 464**	**22 223**	**19 241**	**17 777.7**	**9 658.2**	**8 119.5**	**42.9**
2014/15	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	FTEs AS % OF HEADCOUNTS
Researchers*	38 381	21 060	17 321	15 804.3	8 731.8	7 072.5	41.2
Technicians directly supporting R&D	2 496	1 381	1 115	857.3	509.5	347.8	34.3
Other personnel directly supporting R&D	3 580	1 176	2 404	1 282.8	374.8	908.0	35.8
Total	**44 457**	**23 617**	**20 840**	**17 944.4**	**9 616.2**	**8 328.3**	**40.4**

*Includes doctoral students and post-doctoral fellows.

Table C.144: Higher education sector R&D personnel in headcounts by occupation and gender, and full-time equivalents by occupation (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)	
2012/13	TOTAL	MALE	FEMALE	TOTAL	FTEs as % Of HEADCOUNTS
Researchers*	17 441	9 466	7 975	4 700.6	27.0
Technicians	2 344	1 346	998	737.3	31.5
Other personnel	2 906	899	2 007	1 133.5	39.0
Total	22 691	11 711	10 980	6 571.5	29.0
2013/14	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Researchers*	18 212	9 736	8 476	5 000.5	27.5
Technicians directly supporting R&D	2 284	1 314	970	843.7	36.9
Other personnel directly supporting R&D	3 047	989	2 058	1 161.5	38.1
Total	23 543	12 039	11 504	7 005.7	29.8
2014/15	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Researchers*	18 625	9 876	8 749	5 097.7	27.4
Technicians directly supporting R&D	2 496	1 381	1 115	857.3	34.3
Other personnel directly supporting R&D	3 580	1 176	2 404	1 282.8	35.8
Total	**24 701**	**12 433**	**12 268**	**7 237.8**	**29.3**

*Excludes doctoral students and post-doctoral fellows.

Table C.145: Higher education sector R&D postgraduates in headcounts by qualification and gender, and full-time equivalents by qualification (2012/13, 2013/14 and 2014/15)

OCCUPATION	HEADCOUNTS			FULL-TIME EQUIVALENTS (FTEs)	
2012/13	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Post-doctoral fellows	1 384	816	568	1 296.4	93.7
Doctoral students	14 130	7 911	6 219	7 746.6	54.8
Masters students	35 137	17 646	17 491	17 310.3	49.3
Total	**50 651**	**26 373**	**24 278**	**26 353.3**	**52.0**
2013/14	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Post-doctoral fellows	1 801	1 101	700	1 706.9	94.8
Doctoral students	16 120	9 083	7 037	9 065.2	56.2
Masters students	36 274	17 932	18 342	18 933.6	52.2
Total	**54 195**	**28 116**	**26 079**	**29 705.6**	**54.8**
2014/15	TOTAL	MALE	FEMALE	TOTAL	FTEs AS % OF HEADCOUNTS
Post-doctoral fellows	1 983	1 183	800	1 876.8	94.6
Doctoral students	17 773	10 001	7 772	8 829.8	49.7
Masters students	35 746	17 241	18 505	16 796.7	47.0
Total	**55 502**	**28 425**	**27 077**	**27 503.3**	**49.6**

Table C.146: Higher education sector R&D personnel in headcounts by occupation, qualification, population group and gender (2014/15)

OCCUPATION AND QUALIFICATION	TOTAL	SUBTOTAL		AFRICAN		COLOURED		INDIAN		WHITE	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Researchers*	**18 625**	**9 876**	**8 749**	**3 478**	**2 360**	**787**	**824**	**607**	**621**	**5 004**	**4 944**
Doctoral degree or equivalent	7 756	4 630	3 126	1 158	566	348	268	287	193	2 837	2 099
Masters, Honours, bachelor or equivalent	8 645	4 189	4 456	1 759	1 288	381	464	282	370	1 767	2 334
Diplomas	2 224	1 057	1 167	561	506	58	92	38	58	400	511
Technicians directly supporting R&D	**2 496**	**1 381**	**1 115**	**493**	**469**	**96**	**88**	**253**	**146**	**539**	**412**
Doctoral degree or equivalent	138	92	46	23	7	1	3	8	3	60	33
Masters, Honours, bachelor or equivalent	737	386	351	142	94	25	23	44	63	175	171
Diplomas	1 621	903	718	328	368	70	62	201	80	304	208
Other personnel directly supporting R&D	**3 580**	**1 176**	**2 404**	**506**	**745**	**53**	**87**	**122**	**403**	**495**	**1 169**
Doctoral degree or equivalent	279	154	125	43	33	9	8	2	6	100	78
Masters, Honours, bachelor or equivalent	1 236	401	835	155	244	20	29	34	99	192	463
Diplomas	2 065	621	1 444	308	468	24	50	86	298	203	628
Total	**24 701**	**12 433**	**12 268**	**4 477**	**3 574**	**936**	**999**	**982**	**1 170**	**6 038**	**6 525**

*Excludes doctoral students and post-doctoral fellows.

Table C.147: Higher education sector overview (2014/15)

HIGHER EDUCATION OVERVIEW 2014/15	R&D EXPENDITURE	RESEARCHER HEADCOUNT	RESEARCHER FTE	POSTGRAD HEADCOUNT	POSTGRAD FTE
	R' 000				
Private Universities	**44 834**	**138**	**61.4**	**7**	**5.6**
Universities	**7 748 408**	**15 558**	**4 534.5**	**18 546**	**10 026.6**
Nelson Mandela Metropolitan University	251 402	488	88.3	569	283.4
North West University	628 346	1 103	400.5	1 311	713.6
Rhodes University	229 832	465	160.2	561	561.0
University of Cape Town	1 320 395	1 222	472.1	1 909	1 222.5
University of Fort Hare	40 986	327	65.4	477	214.8
University of Johannesburg	312 935	1 127	242.8	942	528.2
University of KwaZulu-Natal	563 821	1 524	396.2	2 755	1 271.0
University of Limpopo	88 042	453	58.9	263	222.6
University of Pretoria	929 424	1 886	407.2	2 351	1 044.9
University of South Africa	662 891	2 115	1 057.5	2 156	823.7
University of Stellenbosch	981 886	1 128	394.7	1 675	988.2
University of the Free State	327 033	634	179.3	762	367.4
University of the Western Cape	272 594	935	273.9	775	367.9
University of the Witwatersrand	1 098 183	1 852	277.8	1 832	1 321.0
University of Zululand	40 638	299	59.8	208	96.6
Universities of (Science) and Technology	**584 333**	**2 929**	**502**	**1 203**	**674**
Cape Peninsula University of Technology	153 627	552	104.8	210	210.0
Central University of Technology	49 668	281	75.3	117	50.4
Durban Institute of Technology	95 070	359	47.3	188	115.7
Mangosuthu Technikon	20 146	149	29.8	4	4.0
Tshwane University of Technology	137 695	297	49.0	381	137.3
University of Venda for Science and Technology	21 968	337	33.7	209	103.2
Vaal University of Technology	54 693	378	75.6	44	25.0
Walter Sisulu University of Technology and Science	51 467	576	86.4	50	28.8
TOTAL	**8 377 575**	**18 625**	**5 097.7**	**19 756**	**10 706.6**

*Collected personnel data may differ from Higher Education Management Information System (HEMIS) data in some cases due to definitional differences in personnel categories.

D. METHODOLOGICAL NOTES

D.1. Survey design and planning

The South African National Survey of Research and Experimental Development (R&D survey) forms part of the tools for monitoring and evaluating the performance of the National System of Innovation (NSI). Output tables are agreed in advance of the survey between CeSTII and the DST as a standard.

The scope of the survey includes all units performing R&D, either continuously or occasionally.

The R&D survey may be thought of as three survey instruments covering the four main sectors described in the Frascati manual: business enterprise, government, private not-for-profit and higher education sectors. In South Africa, the science councils are extracted from the government sector and are reported separately, thus comprising a fifth South African sector.

The survey collects data in accordance with the guidelines recommended by the OECD in the Frascati Manual (OECD, 2002). This helps to maintain coherence and international comparability. The System of National Accounts (EC, IMF, OECD, UN and the World Bank, 2009) and the National System of Innovation differ on the identification of target units and definitions. The Frascati Manual (OECD, 2002) comments on the main areas of difference that have continued to exist between the two systems, as shown in Table D.1.

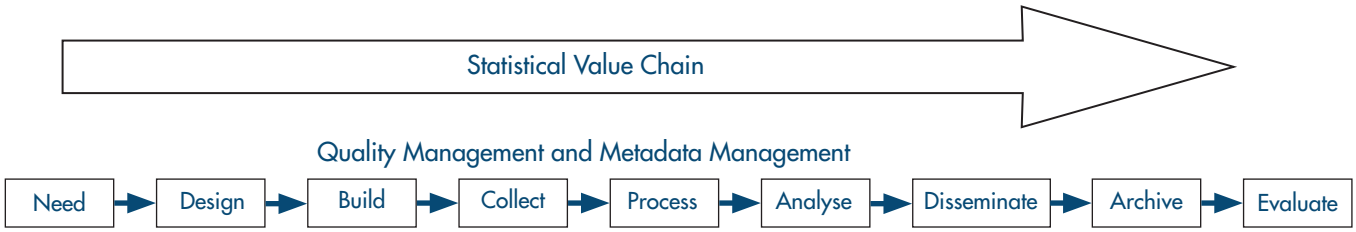
Table D.1: Main institutional sectors in the economy

SYSTEM OF NATIONAL ACCOUNTS SECTOR	NATIONAL SYSTEM OF INNOVATION SECTOR DESCRIPTION
Non-financial corporations Financial corporations	**Business enterprise sector:** "All firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price. The private non-profit institutions mainly serving them."
General government	**Government sector:** "All departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises are included in the business enterprise sector.) [Non-profit institutions] controlled and mainly financed by government, but not administered by the higher education sector."
Non-profit institutions serving households Households	**Private non-profit sector:** "Non-market, private non-profit institutions serving households (i.e. the general public). Private individuals or households."
Included in other SNA sectors	**Higher education:** "All universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education institutions."
Rest of the world	Abroad

In the interests of coherence of its data with other South African economic survey data, the South African R&D survey takes care to use standards and methods applied or recommended by Statistics South Africa. Concepts and definitions are aligned as far as possible with those in use by the National Statistical Organisation (NSO) (Stats SA, 2010a). Indicators that use external data are sourced from Stats SA surveys – gross domestic product values are the values for the 2014 annual reference period taken from the quarterly Stats SA GDP statistical release P0441 (Stats SA, 2016), and employment level is the value for the first quarter of 2015 obtained from the Stats SA Quarterly Labour Force Survey statistical release P02111 (Stats SA, 2015). The survey also uses the Standard Industrial Classification (Stats SA, 2004) codes for business sector industrial classifications employed by Stats SA.

Overall, CeSTII performs quality management in line with practices recommended by Stats SA in the South African Statistical Quality Assessment Framework (SASQAF) (Stats SA, 2010b). The survey was conducted according to a project plan aligned with the phases of the Statistical Value Chain (SVC) illustrated in Figure D.1, which is modelled on practice at Statistics SA.

Figure D.1: Statistical Value Chain used in quality and metadata management



D.2. Frame, sample selection and fieldwork

Three questionnaires were used in the survey for the business sector, the higher education sector, and government departments, research institutes, museums, science councils and not-for-profit organisations.

R&D performers in sectors were taken to be any units that had R&D expenditure, or were likely to have had R&D expenditure, in 2014/15. Table D.2 describes each of the sectors and provides their respective reference periods.

Table D.2: Description of sectors, respective reference periods, sampling methods and fieldwork periods

SECTOR	DESCRIPTION	REFERENCE PERIOD	METHOD OF SURVEYING	FIELDWORK AND FOLLOW-UP PERIOD
Business	Business enterprises, including state-owned enterprises.	Financial year ending 28 February 2015 (or the closest complete financial year).	A purposive design was used for the survey of the business sector, and the frame was constructed from the business register developed and maintained by HSRC-CeSTII, since 2002. All known and likely R&D performers were targeted. The register is undergoing systematic coverage improvement.	08 September 2015 – 31 March 2016
Not-for-profit	Non-governmental and other organisations formally registered as NPOs.	Financial year ending 28 February 2015 (or the closest complete financial year).	Non-governmental and other organisations formally registered as NPOs were surveyed through purposive sampling, similar to the approach adopted for the business sector. The register is undergoing systematic coverage improvement.	17 August 2015 – 31 March 2016
Government	National and provincial departments, local government, museums, research institutes and other research councils with an R&D component.	Financial (fiscal) year ending 31 March 2015.	Government departments were surveyed using a census approach. All national government departments, associated research institutions and museums performing R&D at national, provincial and local levels were included in the government sector.	17 August 2015 – 31 March 2016
Science councils	The nine science councils established through Acts of Parliament.	Financial (fiscal) year ending 31 March 2015.	Seven statutory science councils were surveyed, using a census approach.	17 August 2015 – 31 March 2016
Higher education	All public higher education institutions as well as private higher education institutions that performed R&D. Teaching hospitals were also included in this sector.	Calendar year (ending 31 December 2015).	Higher education institutions, namely universities, universities of science and technology, institutes of education and private higher education institutions were included in the higher education sector frame. All public higher education institutions were surveyed, using a census approach.	2 September 2015 – 31 March 2016

For each sector, a list of R&D-performing units was identified from existing lists and intelligence gathering operations. These units were verified as R&D performers to determine the units to be surveyed before collection began.

Business sector

CeSTII has developed a register of potential R&D performers in the business sector from several information sources, including the following lists: JSE Limited Top 100 Companies, Technology Top 100, Support Programme for Industrial Innovation (SPII) and Technology and Human Resources for Industry Programme. The 711 business sector units selected for surveying from the

R&D business sector register compiled by CeSTII included 271 units that were obtained from investigating a list of units that had applied for R&D tax incentives. The expanded coverage from the R&D tax incentives list is described in greater detail in Section D.3.

There was one particular outlier in the Business sector, which was an enterprise in the Financial Intermediation, Real Estate and Business Services. This unit was further investigated and it was confirmed by sector staff that the rapid growth in R&D was due to a real change in business strategy, and not a statistical anomaly. It is quite feasible that large units that are relatively impervious to an unfavourable economic climate may choose to scale up R&D expenditure in adverse conditions as a means of securing a competitive advantage in the future (Mustapha, Blankley, Makelane, & Molotja, 2015).

Science councils sector

Seven R&D-active science councils responded to the survey questionnaire. One of these science councils was surveyed at the level of its constituent units, resulting in a total of 13 reporting units surveyed in the science councils sector.

Not-for-profit sector

There is an ongoing process of substantial improvement in coverage of the not-for-profit sector by investigating a comprehensive list of 17 324 NPOs. A total of 309 units were investigated for the 2014/15 survey, comprising units selected for the 2012/13 survey as well as a sample of units from the list. The NPO frame for the 2014/15 survey comprised a total of 81 units that were identified as likely R&D performers.

Government sector

The government sector investigated a list of 164 units consisting of national and provincial departments, municipalities, research centres and museums, of which 104 units were selected for surveying.

Higher education sector

In the 2014/15 R&D survey, the survey frame for the higher education sector was 32, which consisted of 9 private universities and 23 public universities. The funding of research chairs, while not explicitly delineated to respondents, would be include in these estimates.

D.3. Fieldwork

The R&D data were collected by means of questionnaires that were sent to the units in each sector by surface and/or electronic mail.

A unit was considered as a response if it completed and returned a questionnaire with non-zero in-house R&D expenditure; if the unit's in-house R&D expenditure, headcounts, and sources of fund data were reported by the respondent without a completed questionnaire; or if data were confirmed by the respondent after being imputed based on secondary data sources. The data sources used for imputation included previous R&D survey responses as well as other private and public data sources such as the Higher Education Management Information System (HEMIS) and Support Programme for Industrial Innovation (SPII).

D.4 Coverage matters

Business sector

The business sector implemented a systematic means of increasing the coverage in the sector by adding firms that applied for R&D tax incentives through the DST. The list of 624 entities was assessed in relation to the coverage on the CeSTII R&D register. Of these 624 units, 572 were selected for inclusion in the 2014/15 R&D survey for operational reasons.

It was found that some of the units were either subsidiaries of parent companies already covered, were no longer in operation and were already on the CeSTII register, were recently added in the 2013/14 survey year.

- Of the total 572 investigated, 38 were already on the register, leaving 534 for further investigation to obtain contact information for reporting units.

- Of the 534, 445 had reasonable contact information online to make contact with the companies. Subsidiaries or legal units were hard to trace.
- Within the 445 companies that appeared to be contactable, 304 were confirmed with contact information – email, telephone and name.
- Among the 304 units added to the frame, 33 did not meet the Frascati definitions for R&D and were excluded (market research etc.) as out-of-scope.
- A total of 271 units were therefore carried into the 2014/2015 R&D survey fieldwork.

The contribution to the survey results of these 271 units have been assessed in terms of the overall frame selected for surveying in 2014/15. The overall frame size totalled 711, fieldwork produced 529 returns totalling R 13.290 billion (BERD). Among those 529 units, 271 were from the tax incentive list and the results are presented below.

Table D.3: Improved coverage due to R&D tax incentives entities

	AMOUNT	PROPORTIONAL CONTRIBUTION	NUMBER OF UNITS
	Rand million	%	
BERD	**13 291**		**529**
Total tax incentive list contribution to BERD	**583**	**4.4***	**271**
R&D expenditure above R10 million	316	54.2	12
R5 million < R&D expenditure < R10 million	115	19.7	16
R&D expenditure below R5 million	152	26.0	75
Nil (Out-of-Scope)	0	0.0	66
Other non-response			102

* % of BERD

The R&D expenditure contribution from the R&D tax incentive list to GERD was 2.0%. This additional coverage contributed one and a half basis points to the R&D intensity ratio.

Not-for-profit sector

The NPO sector is in the third year of systematically improving its coverage. In 2012/13, the NPO sector experienced markedly improved coverage contributing an additional 1.2% to GERD, which was described in a previous report (CeSTII, 2014). This additional coverage had the effect of increasing the R&D intensity by one basis point.

In 2014/15, the NPO sector enhanced coverage by R185 million through the addition of five units, all of whom had R&D expenditure greater than R10 million. Such additional coverage may be accounted for in future revisions of the series, once the coverage enhancement reaches a level of saturation.

Table D.4: Improved coverage in the NPO sector

	AMOUNT	PROPORTIONAL CONTRIBUTION	NUMBER OF UNITS
	Rand million	%	
NPO R&D expenditure	779		58
Total additional coverage contribution to NPO R&D expenditure	185	23.8% of NPO	5

As a proportion of GERD, the additional coverage in 2014/15 is relatively small at 2.0%. However, viewed as a proportion of overall NPO R&D it is relatively large. The additional coverage was 23.8% of NPO R&D expenditure, and care is advised when making inferences on trends in the NPO sector.

D.5. Quality indicators of survey coverage, fieldwork and analysis

A summary set of quality indicators for the collection and imputation phases of the survey processes in Table D.5 records an overall questionnaire response rate of 62.5%.

The weighted response rate of 94.0% gives an estimate of the size of national R&D expenditure captured from responses alone; that is, excluding the proportion contributed by imputed units.

A partial reason for the relatively high number of out-of-scopes in the business, not-for-profit and government sectors may be attributed to the nature of the scope of R&D surveys conducted according to Frascati standards, where the units selected for surveying include *likely* R&D performers in addition to known R&D performers. The nature of R&D is such that there may be a very small number of projects active in the R&D-performing business unit of a firm. These projects typically last for around three years, according to reports arising from the fieldwork. Upon termination of the project, the R&D expenditure of a firm would thus be nought for a particular reference period, which with the existing CeSTII operational procedures would classify it as an out-of-scope unit, even though it might probably perform R&D again in the future. For this reason the R&D survey will henceforth use collection rate (as it is used at the NSO) instead of questionnaire response rate as the key quality indicator of the collect phase of the SVC. However, both indicators are reported in this survey.

Non-response[6] was defined as failure to obtain a measurement on one or more variables for one or more units selected for the survey. These include out-of-scope units.

Out-of-scope units are defined as units that should not be included in the survey frame because they did not belong to the target population in the reference period. Entities that returned a questionnaire stating nil in-house R&D expenditure for the survey reference period were counted as out-of-scope for the 2014/15 R&D survey.

In-scope units[7] were defined as units performing in-house R&D or with likely in-house R&D activity; units that indicated that no R&D had been performed during the 2014/15 period were classified as out-of-scope.

Questionnaire responses were defined as those units that were not classified as non-responses within the set of all questionnaires sent out. The questionnaire response rate was calculated using the following formula:

$$\text{Questionnaire response rate} = \frac{\text{Responses}}{(\text{Responses} + \text{Non-response} - (\text{Out-of-scope})}$$

Collection rate was defined as the proportion of completed questionnaires received for the survey compared to the total number of actively-reporting sample units on the sample registry.

$$\text{Collection rate} = \frac{\text{Responses} + \text{Out of scope} + \text{Refusals}}{\text{active reporting units}}$$

The *weighted response rate* is a measure of the fraction of R&D expenditure collected from responses. It was calculated as

$$\text{Weighted response rate} = \frac{\text{R\&D expenditure obtained from responses}}{(\text{R\&D expenditure obtained from responses} + \text{unit imputations})}$$

The *survey unit imputation* rate was defined as the number of eligible non-responding units that had all data imputed as a fraction of eligible units. It was calculated using the following formula:

$$\text{Survey unit imputation rate} = \frac{\text{Unit imputations}}{(\text{Response} + \text{Non-response} - (\text{Out-of-scope})}$$

6 Adapted from (Sarndal, Swensson, & Wretman, 1992).

7 This is the CeSTII operational definition.

Table D.5: Quality indicators of survey coverage by sector

SECTOR	NUMBER OF UNITS INVESTIGATED	NUMBER OF UNITS SELECTED TO COMPILE STATISTICS	NON-RESPONSE	OUT-OF-SCOPE	RESPONSES	QUESTIONNAIRE RESPONSE RATE	COLLECTION RATE	UNIT IMPUTATION RATE	SURVEY QUESTIONNAIRE COVERAGE RATE	CONFIRMED IN-SCOPE REPORTING UNITS	R&D EXPENDITURE WEIGHTED RESPONSE RATE
Business	754	711	316	134	395	68.5%	74.4%	7.5%	61.6%	438	93.1%
Not-for-profit	309	81	35	12	46	66.7%	74.1%	1.4%	58.0%	47	100.0%
Government	164	104	42	4	62	62.0%	87.5%	1.0%	60.6%	63	99.6%
Science councils	13	13	0	0	13	100.0%	100.0%	0.0%	100.0%	13	100.0%
Higher education	32	32	11	0	21	65.6%	65.6%	18.8%	84.4%	27	90.0%
Total	**1 272**	**941**	**404**	**150**	**537**	**67.9%**	**75.9%**	**6.4%**	**62.5%**	**588**	**94.0%**

D.6. Imputation

Imputation is a procedure for entering a value for a specific data item where the response is missing or unusable. The R&D survey strives to keep the rate of imputation as low as possible, while striving to include all likely sources of R&D activity in the final estimates. Since 2012/13, the rates of imputation employed have been reported, along with the age of the data used to impute (Table D.6). A unit is selected for imputation only if sector leaders have convinced themselves of the existence of R&D activity in those units. Where it was not possible to obtain company confirmation, individual fieldworkers were responsible for providing evidence of on-going R&D activity to qualify units for imputation. The survey employed varying degrees of imputation, ranging from using a total R&D expenditure figure reported by the respondent (by e-mail or telephone), followed by imputing the remaining data items from available sector R&D profiles, to generating an R&D profile for a unit based on its known historical R&D profile adjusted by the GDP inflation factor, or using publicly available data on a unit's R&D. The imputation models were unchanged from those used in the 2013/14 survey. Financial data on R&D were adjusted by a GDP inflation factor of 7.417.

Table D.6: Number of units and age of data used in the imputation models by sector

AGE OF DATA	BUSINESS	NPO	GOVERNMENT	SCIENCE COUNCILS	HIGHER EDUCATION
Imputed (data from current reference period)	0	0	0	0	0
Imputed (data from previous year)	0	0	0	0	0
Imputed (data more than one year old)	0	0	0	0	0
Commuted (data from previous year)	36	1	1	0	2
Commuted (data more than one year old)	7	0	0	0	4
Total	**43**	**1**	**1**	**0**	**6**

Personnel data for non-responding higher education institutions were imputed from personnel data obtained from HEMIS. R&D expenditure for these units was imputed from a mathematical model or left unchanged from previous estimates.

Details of the imputation methods are available on request.

D.7. Data processing and analysis

Once the individual responses to the questionnaires, including summation and percentage calculations, had been checked by the relevant fieldworker, the data were manually entered on the R&D Survey Management System (RDSMS). Summary data was drawn from the system, and anomalies were identified by cross-checking results and returned to the sector leader for correction, when necessary.

Data tables were drawn from the data in the form of outputs agreed upon by CeSTII and the DST. These included time-series data that were added from previous surveys for the purpose of multi-year comparison.

Tables on the State Owned Enterprises (SOEs) were produced by selecting known SOEs from the enterprises in the Business sector. The list of SOEs was developed by CeSTII over several years, and was checked against the treasury list (National Treasury, 2015) and augmented with additional units if necessary.

D.8. Dissemination of survey results

The 2014/15 R&D survey reports will be disseminated to all respondents as well as to other users of the R&D statistics.

This report is available on request from CeSTII and the DST. The report can be downloaded from the CeSTII website http://www.hsrc.ac.za/en/departments/cestii/sa-national-survey-of-research-and-experimental-development) or the DST website (http://www.dst.gov.za/index.php/resource-center/rad-reports). Care is taken to ensure the confidentiality of respondent information, and the data presented in the report are therefore anonymised as far as possible.

D.9. Storage and archiving of survey results

The data from the R&D survey series have been archived according to established CeSTII procedures. Hard copies of the data from the two most recent surveys are kept in safe storage at CeSTII, while the data from older surveys are kept in safe storage off site. All data are stored electronically on secure servers, and daily back-ups of databases are generated.

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F. R&D SURVEY QUESTIONNAIRE

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Company	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 National Survey of Inputs into Research and Experimental Development (R&D) for the Department of Science and Technology (DST). The **Survey is conducted in terms of the Statistics Act No. 6 of 1999**. Organisations are therefore legally required to respond by providing accurate data on R&D performance. All data gathered for this survey are confidential. Only the survey team have access to 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 to support decisions about strengthening South Africa's competitiveness. Previous survey results may be viewed at http://www.hsrc.ac.za/en/departments/cestii. This survey covers the Financial Year 1 March 2013 to 28 February 2014 (or your nearest complete financial year).

DUE DATE

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

PLEASE KEEP A COPY OF THIS QUESTIONNAIRE FOR YOUR RECORDS

ASSISTANCE

To assist you with queries kindly contact one of the survey manager(s):

Name	Contact Number	E-mail
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Senior Research Specialist
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DETAILS OF PERSON COMPLETING THE QUESTIONNAIRE:

Name (with title)		Tel	( )
Designation		Fax	( )
Date		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 on R&D 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 codes book) from which your company derives its main income.

Activities	SIC	Company Income Obtained (%)
		%
		%
		%
	Must sum to 100%	%

3. Parent Company (if applicable) with % ownership

	%

3.a Is this company a state owned enterprise (SOE)

Yes		No	

Definition: *SOE* are public corporations owned by government units mainly engaged in market production and sale of the kind of goods and services often produced by private enterprises.

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

South Africa	
Rest of Africa	
Europe	
USA	
China	
Rest of Asia	
Other	

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)	

8. 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. Did the company perform any IN-HOUSE R&D in South Africa during the 2014/15 financial year? Please tick as appropriate

Yes		No	

Do you think your organisation will perform in-house R&D in the future?

Please tick	2014-2015	2015-2016	2016-2017
Yes			
No			

8c. Did your company Outsource R&D during the 2014/15 financial year?

Yes		Proceed to Part 5: Question 21 and 22 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.

No		i.e. No in-house nor out-sourced R&D.

Thank you for providing "General Information" on your company (part 1).
We now proceed with information on your In-House R&D (parts 2, 3 & 4).

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 & Research Managers)											
Doctorates											
Masters/Hons/Bachelors or equivalent											
Diplomas and other qualifications											
RESEARCHER TOTAL											
Technicians /Technologists directly supporting R&D											
Doctorates											
Masters/Hons/Bachelors or equivalent											
Diplomas and other qualifications											
TECHNICIAN TOTAL											
Other personnel directly supporting R&D											
Doctorates											
Masters/Hons/Bachelors or equivalent											
Diplomas and other qualifications											
TECHNICIAN TOTAL											

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 x 1 x 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 x 0.4 persons x 0.5 years = 0.2 person years of R&D effort
-a **part-time** employee working **40%** of a full time year doing only R&D
0.4 x 1x 1 = 0.4 FTE to the R&D effort.
-20 fulltime male researchers spending 40% of their time on R&D during the survey year:
20 x 0.4 x 1 = 8

NOTE: please calculate FTE's for all R&D personnel

R&D Personnel Categories	Headcounts (From Q9)			Total Full Time Equivalents (FTE's)			Average annual labour cost per person	Calculated labour cost of R&D
	M	F	Total	M	F	Total (A)	R'000 (Excl. VAT) (B)	R'000 (Excl. VAT) (A x B)
Researchers (incl. Research Executives & 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

• The full value of capital expenditure must be reported in the year of purchase (do not depreciate). • If the asset has been/will be used for more than one activity, include an estimate of the portion used for R&D.

Including – but not limited to:	*Excluding:*
• Expenditure on fixed assets used in the R&D projects of your business. • Acquisition of software for R&D, including fees, expected to be used for more than one year. • Purchase of databases expected to be used for more than one year. • Major repairs & improvements on land & buildings used for R&D.	• Other repairs and maintenance expenses. • Depreciation provisions. • Proceeds from the sale of R&D assets.

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

LABOUR COSTS OF R&D

		R'000 (Excl. VAT)
LABOUR COSTS of R&D **(To match Question 10)**	C	

OTHER CURRENT EXPENDITURE ON R&D

Including – but not limited to:	Excluding:
• Materials, fuels and other inputs (including all running costs). • Water, electricity and other overhead expenses. • Repair and maintenance expenses. • Payments to outside organisations for use of specialised testing facilities. • Payments to outside organisations for analytical work, engineering or other specialised services in support of R&D projects carried out by your business. • Commission/consultant expenses for research projects carried out by your business. • Other R&D expenses and indirect costs not specified in 11 A, B or C.	• R&D activities where the research project is carried out elsewhere by others on behalf of your business. • Payments for purchases of technical know-how. • Payments for patent searches. • Depreciation provisions.

		R'000 (Excl. VAT)
Other Current Expenditure	D	

		R'000 (Excl. VAT)
TOTAL R&D EXPENDITURE (A + B + C + D = E)	E	

12. Please estimate future in-house R&D expenditure:

ESTIMATED FUTURE R&D EXPENDITURE:

In-House R&D *(Report in R'000 Excl. VAT)*	
2014/15	2014/15

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 (including Trade Associations)	
Contracts to perform R&D	
Other South African Sources	
Not for Profit Organizations* (including Foundations)	
Individual Donations	
Higher Education	
Foreign	
All sources	

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

*Non-profit organisations primarily serving households. Funding from non-profit organisations primarily serving by Business, Higher Education or Government should be allocated to these sectors.

14. FOREIGN SOURCES OF FUNDS (in R000's) FOR IN-HOUSE R&D

14a. If your organisation received no R&D funding from foreign sources kindly tick N/A here and move to question 15:

N/A	

14b. Kindly categorise Foreign R&D funding (from Question 13) by sector and region.

Foreign funding of R&D		SUB TOTAL (R000's) made up of							
Category	Category SUB-TOTAL	Africa (outside SA)	Middle East	Europe	USA / Canada	Central & South America	China	Rest of Asia	Other
Business*	R								
Not-for-Profit Organisations** / Individuals	R								
Foundations	R								
Government	R								
Higher Education	R								
TOTAL	R	TOTAL to correspond with Foreign funds in Q 13 above							

* Including affiliated company, trade associations (Affiliated denotes parent or subsidiary organisation)

** NPO's serving households only. Funding from non-profit organisations primarily serving by business, higher education or government should be allocated to these sectors.

15. 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	%
TOTAL (must sum to 100%)	%

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

16. 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 %

TOTAL	%

17. Classify R&D according to Standard Industrial Classification (SIC).
(See Appendix A in the codes book) with associated % expenditure.

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

SIC Codes		Percentage
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%

SIC Codes		Percentage
SIC		%
SIC		%
SIC		%
SIC		%
SIC		%
Total		%

18a. RESEARCH FIELD (RF)

Classify R&D according to Research Fields (RF) with associated % expenditure. (See Appendix B in the codes book.)

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

RF Codes		Percentage
RF		%
RF		%
RF		%
RF		%
RF		%

RF Codes		Percentage
RF		%
RF		%
RF		%
RF		%
RF		%
Total (must sum to 100%)		%

18b. 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 % 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	% of R&D expenditure
Biotechnology	%
Nanotechnology	%

No R&D in these areas		← TICK if no such R&D is done

18c. SPECIFIC AREAS OF R&D

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

- National R&D strategies emphasise the importance of certain areas of R&D.
- Some of these 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	% of R&D expenditure
Open-source software	%
New materials	%
Tuberculosis (TB), HIV/AIDS, Malaria	%
Environment / Environment related	%

No R&D in these areas		← TICK if no such R&D is done

19. Classify R&D according to Socio-economic objectives with associated % expenditure.

(See Appendix C in codes book.)

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

SEO Codes		Percentage
SEO		%
SEO		%
SEO		%
SEO		%
SEO		%

SEO Codes		Percentage
SEO		%
SEO		%
SEO		%
SEO		%
SEO		%
	Total	%

20. COLLABORATIVE R&D

20a. Does your company collaborate on R&D with persons / organisation outside your own organisation?

Yes		Continue with Question 20.b	No		Go to question 21

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

Note: In the table below a single collaborative R&D project with several partners may be ticked in several places. Collaborative R&D may be in-house or out-sourced. R&D collaboration can occur without expenditure – please note zero expenditure in such cases.

(Tick as appropriate)

	South Africa	Foreign	Foreign consisting of . . . (tick as appropriate)							
			Africa (outside SA)	Middle East	Europe	USA / Canada	Central & South America	China	Rest of Asia	Other
Higher Education Institutions										
Science Councils (e.g. CSIR, Mintek, MRC, ARC etc.)										
Government Research Institutes										
Members of own organisation / Affiliated* organisations										
Other Companies (including specialist consultants, business and trade associations)										
Not-for-profit organisations**										
NO COLLABORATION										
	R 000s Excl VAT	R 000s Excl VAT								
TOTAL (in-house & outsourced) R&D Collaboration expenditure										

* Affiliated denotes parent or subsidiary organisation

** NPOs serving households only. Funding from non-profit organisations primarily serving by Business, Higher Education or Government should be allocated to these sectors

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

21. State value of R&D outsourced inside South Africa.

R'000 (Excl. VAT)

21a. Please indicate the name of the organisation(s) that conducted the outsourced R&D with the associated expenditure inside South Africa.

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

22. State value of R&D outsourced outside South Africa.

R'000 (Excl. VAT)

22a. If you have indicated R&D outsourced to outside South Africa in question 22, kindly provide the sector and geographic location of this outsourced R&D expenditure.

		SUB TOTAL (R000's) made up of:							
Category	Category SUB-TOTAL	Africa (outside SA)	Middle East	Europe	USA / Canada	Central & South America	China	Rest of Asia	Other
Business	R								
Not-for-Profit Organisations / Individuals	R								
Foundations	R								
Government	R								
Higher Education	R								
TOTAL	R								

THANK YOU FOR YOUR TIME AND EFFORT

Respondent feedback:
Respondents may use this section to provide general feedback or data notes to the survey team:

G. USER SATISFACTION SURVEY

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 e-mail to cestiidata@hsrc.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.

Thank you for completing the survey.

H. NOTIFICATIONS

Produced by the Centre for Science, Technology and Innovation Indicators (CeSTII) on behalf of the Department of Science and Technology (DST).

First published: March 2017

Dissemination

This report may be downloaded free of charge from the following links.

- http://www.hsrc.ac.za/en/cestii/
- http://www.dst.gov.za/index.php/resource-center/rad-reports

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 approved data access protocol, and requests should be sent to cestiidata@hsrc.ac.za.

User feedback

A User Satisfaction Survey (USS) questionnaire is included in Section G of this report. It would be appreciated if users could complete the questionnaire and return it by e-mail to cestiidata@hsrc.ac.za. The feedback is analysed following each survey cycle to ensure the continued improvement of the R&D survey.

Revisions

The DST, Stats SA and the CeSTII jointly reserve the right to revise the data, indicators and analysis contained in this report. Such revisions may result from revisions by Stats SA of socio-economic indicators such as the GDP, or population or employment numbers, or amendments in response to internal and external data quality and consistency monitoring such as that carried out by the OECD, which conducts quality checks through global comparative analysis, time series analyses and other methods. Explanations of any revisions will be made available and accessible on the DST and HSRC websites.

I. NOTES

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STATISTICIAN-GENERAL
NSS
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