

Research and Development Survey: 2012

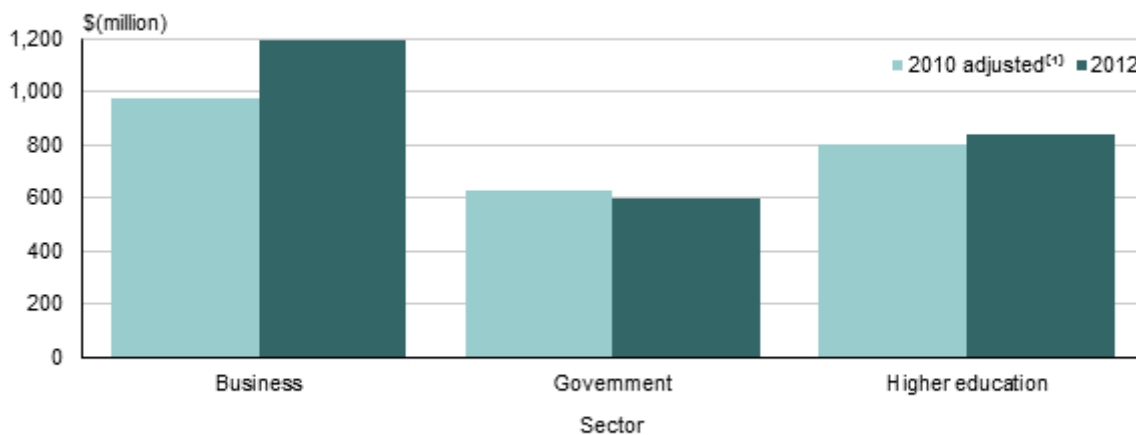
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Key facts

In 2012:

- Total research and development (R&D) expenditure was \$2.6 billion, up 9 percent from 2010.
- Business R&D expenditure jumped by 23 percent, to reach \$1.2 billion.
- Nearly half of businesses expected to pay back their R&D investment within two years.
- Government R&D expenditure dropped, but government funding of business R&D increased by over 70 percent.
- The amount of R&D performed by the higher education sector remained steady.

Total research and development expenditure
By sector



1. The 2010 adjusted results have partly been modelled to ensure they are as comparable as possible with the 2012 results.

Source: Statistics New Zealand

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Commentary

- Businesses boost R&D
- More government funds to firms
- All types of R&D on the up
- Jump in R&D not enough to catch other countries
- Key industries benefit from R&D
- R&D a foothold into markets
- More R&D people – both with and without white coats
- Government sector tops bioscience R&D

We use the following definition of R&D which is based on the Organisation of Economic Co-operation and Development's (OECD) Frascati Manual 2002: "Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge. Any activity classified as R&D is characterised by originality. Investigation is a primary objective."

Please see the Definitions section for more information about research and development and the Research and Development Survey 2012.

Businesses boost R&D

The business sector was responsible for close to half of all R&D expenditure in New Zealand in 2012. Since 2010 this sector has risen by almost 25 percent to \$1.2 billion. Total R&D spend across all sectors increased by 9 percent to \$2.6 billion.

Government sector R&D spend decreased by 5 percent to \$596 million, but still contributed almost a quarter of all R&D expenditure in New Zealand.

Universities in the higher education sector increased their R&D expenditure by 4 percent to \$836 million in 2012.

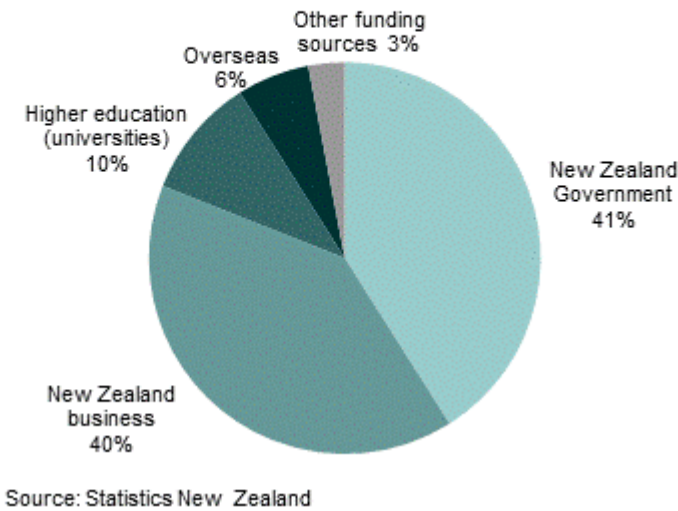
More government funds to firms

Government funding of business sector R&D increased by over 70 percent, to \$146 million, up from \$82 million in 2010.

Total funding from businesses, universities, overseas, and other sources all increased from 2010. Business and government funding of R&D is fairly even, both contributing funding of around 40 percent of R&D undertaken in New Zealand in 2012.

While most business funding remains within the business sector, government funding covers all sectors. Despite the increase in funding to business, most government money is still directed towards the higher education and public sectors.

Research and development expenditure
By source of funds
2012



All types of R&D on the up

R&D includes a range of activities, which can be grouped under three broad headings:

- **basic research** searches for new knowledge or technologies to underpin a range of applications
- **applied research** determines possible uses of basic research towards a specific practical aim or objective
- **experimental development** uses knowledge gained from research and practical experience to produce new or improved materials, processes, or products.

All three types saw increases in expenditure, but the mix became more focused towards applied research.

Type of R&D	2012		2010	
	\$(million)	% of total	\$(million)	% of total
Basic research	675	26	662	28
Applied research	1,080	41	902	38
Experimental development	871	33	838	35

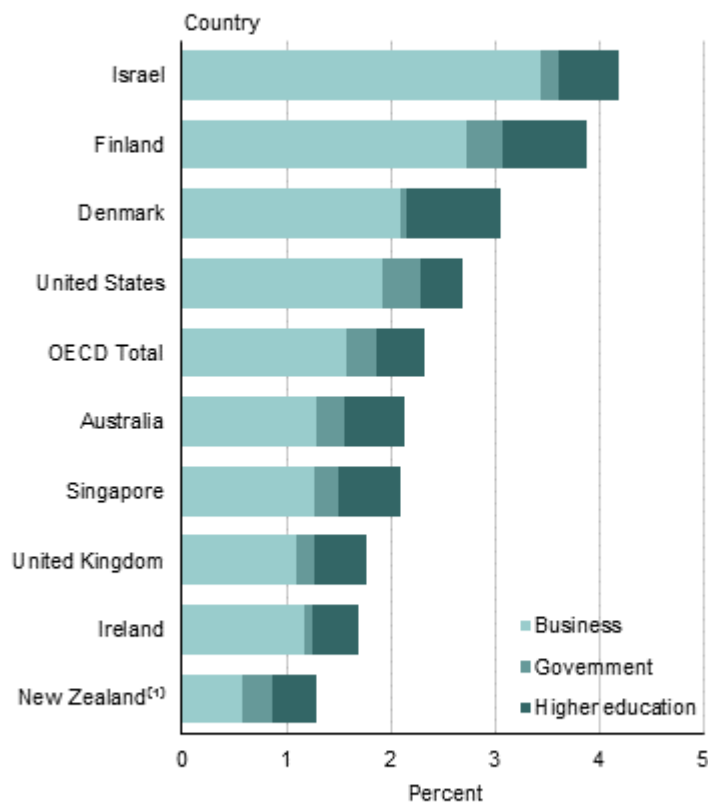
The predominant type of R&D varies across the sectors – businesses conduct more experimental development, while government and higher education R&D is directed more towards research.

Jump in R&D not enough to catch other countries

Relative to other OECD countries of similar size, or those with which New Zealand is often compared, our R&D expenditure is relatively low.

Research and development expenditure as a proportion of GDP

By sector
Latest available year



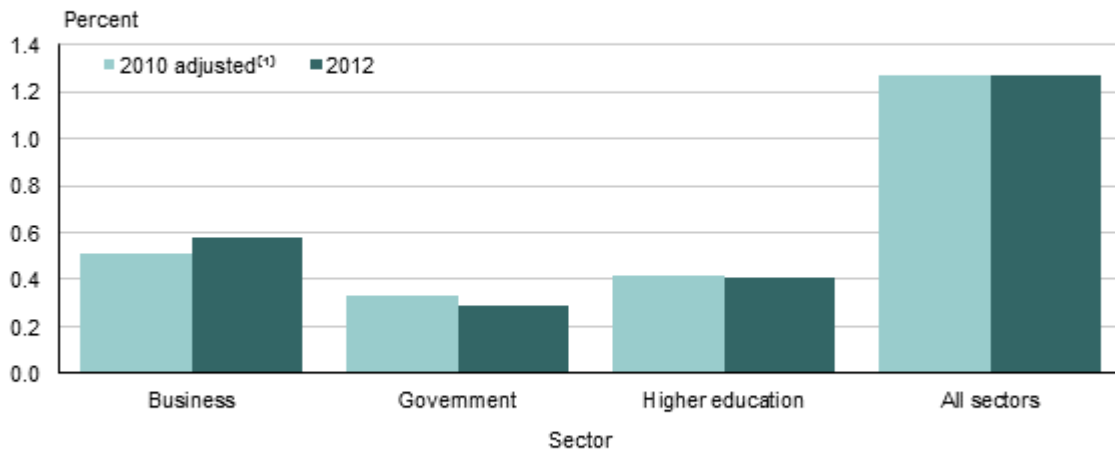
1. Data for countries other than New Zealand only available for 2010.

Source: Statistics New Zealand

Total R&D expenditure in New Zealand represented 1.27 percent of gross domestic product (GDP). This has remained unchanged from 2010. This is due to the R&D expenditure increase being offset by a similar increase in New Zealand's GDP current price expenditure measure. New Zealand's rate of R&D is much less than the corresponding proportion for the OECD total (2.38) or those of comparator countries.

New Zealand's proportion of R&D undertaken by the government sector has traditionally been higher than in other countries, with the proportion undertaken by businesses correspondingly low. Government R&D is driven by Crown research institutes, who are some of the larger R&D performers in New Zealand. These types of organisations and others conduct industry-good research, which would often be covered by the business sector in other countries. However, the increase in business R&D over the last two years does start to bring New Zealand closer to the mix seen in other countries.

Research and development expenditure as a proportion of GDP By sector



1. The 2010 adjusted results have partly been modelled to ensure they are as comparable as possible with the 2012 results.

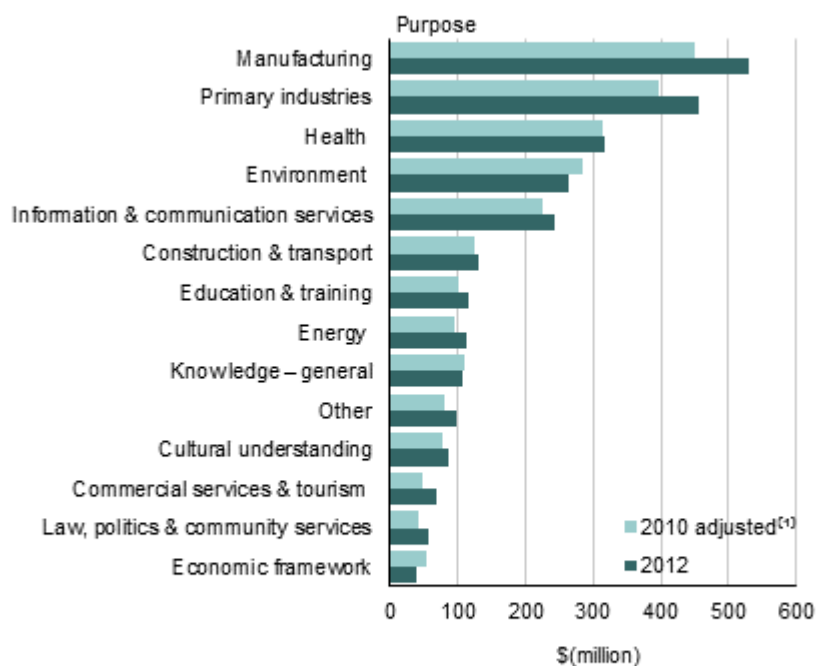
Source: Statistics New Zealand

Key industries benefit from R&D

Manufacturing, primary industries, and health are the top three areas of the economy to which R&D expenditure is targeted. This picture is unchanged from 2010.

Almost three quarters of manufacturing-focused R&D was performed by the business sector, \$385 million in 2012. Businesses also performed over 80 percent of information and communication services R&D. The government performed the most R&D for primary industries, while most health-related R&D was performed by the higher education sector.

Research and development expenditure By purpose of research



1. The 2010 adjusted results have partly been modelled to ensure they are as comparable as possible with the 2012 results.

Source: Statistics New Zealand

R&D a foothold into markets

New information was collected in 2012 from businesses undertaking R&D, on their motivations for undertaking it and the expected benefits.

Gaining entry into new markets was the main reason for businesses undertaking R&D, as reported by over a third of businesses. A quarter undertook R&D to maintain their position in the market.

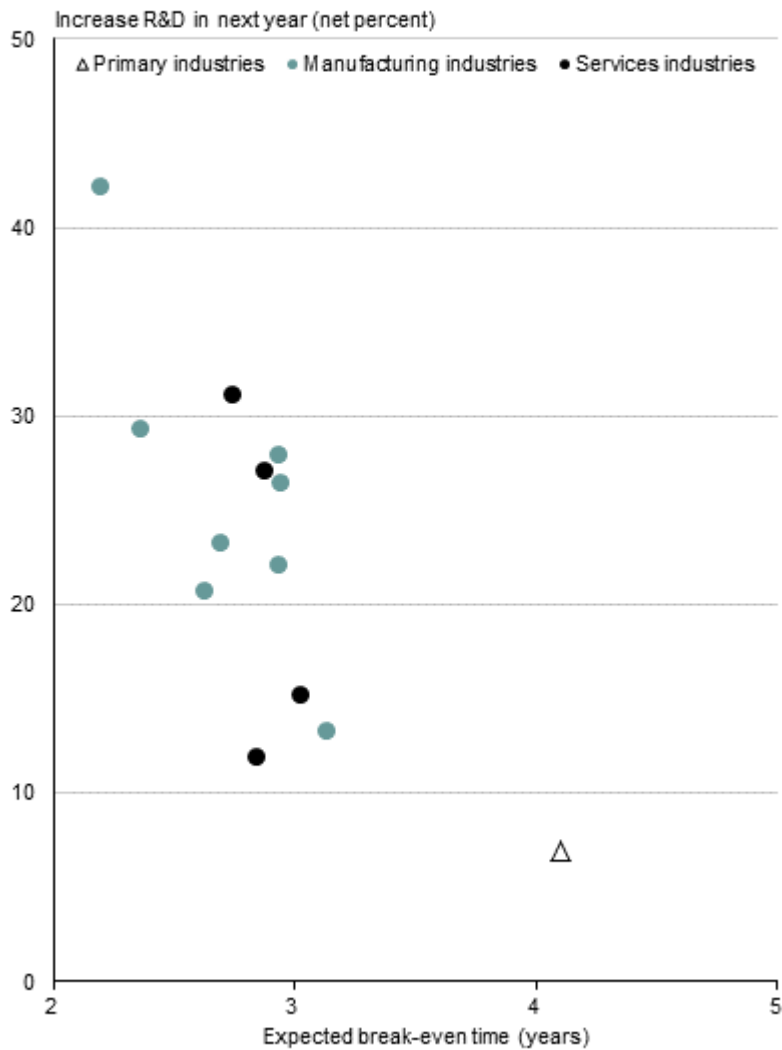
Businesses can take some time to reap the rewards of their R&D investment. But the vast majority expected to break even within five years.

Businesses were also asked about their R&D activity over the next year, with 38 percent indicating levels would stay the same and a similar number saying they would increase.

However, as time taken to break even on R&D investment increases, firms are less likely to increase their level of R&D in the future. Results show that the primary industries take a lot longer to break even than other industries and this is shown as an outlier on the graph below.

Proportion expecting to increase R&D in next year and break-even time on current investment

For selected industries
2012



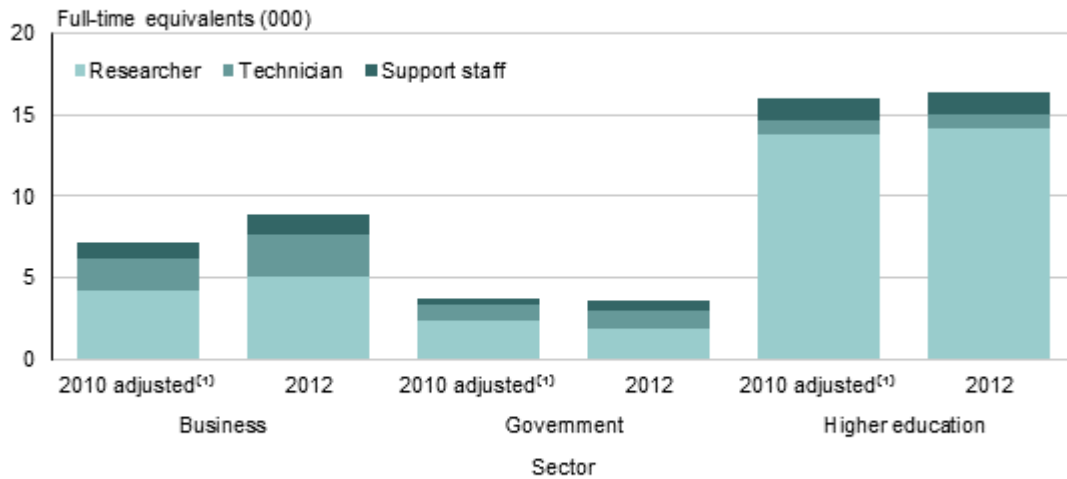
Source: Statistics New Zealand

More R&D people – both with and without white coats

R&D personnel increased to 28,700 full-time equivalents, up from 27,100 in 2010.

This increase was driven by the business sector, up 21 percent from 2010, and is seen across all occupation groups (ie researchers, technicians, and support staff).

Personnel involved in research and development 2010 and 2012



1. The 2010 adjusted results have partly been modelled to ensure they are as comparable as possible with the 2012 results.

Source: Statistics New Zealand

Government sector tops bioscience R&D

Bioscience has applications in diverse fields such as health, animal and plant breeding, food manufacturing, and aquaculture.

Almost half a billion of the R&D spend was attributable to bioscience, but there was a drop of \$24 million from 2010. The government sector contributed the most towards bioscience R&D, at \$202 million.

The business sector increased spending towards bioscience R&D to \$111 million, up from \$90 million in 2010. The higher education sector contributed \$182 million toward bioscience R&D, down from \$193 million in 2010.

For more detailed data, see the Excel tables in the 'Downloads' box.

Definitions

About the Research and Development Survey 2012

The Research and Development Survey, conducted every two years, is a joint survey with the Ministry of Business, Innovation and Employment (MBIE). The survey measures the level of research and development (R&D) activity, employment, and expenditure by business sector enterprises, government departments, government-owned trading entities, and universities.

Types of research and development

The government and Crown research institute (CRI) sector questionnaires asked for R&D expenditure to be categorised into the following R&D types: basic research, targeted basic research, applied research, and experimental development. The business sector questionnaire did not make a distinction between basic research and targeted basic research. The type of R&D breakdown relates to the following definitions.

Basic research: carried out for the advancement of knowledge, without seeking long-term economic or social benefits or making any effort to apply the results to sectors responsible for their application.

Targeted basic research: produces a broad base of new knowledge likely to underpin solutions to current or future applications.

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

Experimental development: systematic work, drawing on knowledge gained from research and practical experience, that is directed at producing new materials, products, and devices; installing new processes, systems, and services; or improving substantially those already produced or installed.

The wording of these definitions is the result of cognitive testing of the definitions provided in chapter 4 of the OECD's *Frascati Manual 2002* and the 1991 *Glossary of Terms for Scientific and Technological Activities in New Zealand*.

Higher education (university) sector: types of R&D expenditure were provided for four types of research: pure-basic research, targeted-basic research, applied research, and experimental development. These types of research were based on the Frascati Manual 2002 definitions.

All sectors: includes basic research, applied research, and experimental development. Statistics are compiled for all three types research types for the business, government, and the higher education sectors.

More definitions

ANZSIC06: Australian and New Zealand Standard Industrial Classification (2006 version).

Bioscience: the development and application of knowledge of the way plants, animals, and humans function for the development of products and services.

Bioscience activities may occur in the following areas:

- agriculture feedstock and chemicals
- aquaculture, horticulture, and forestry
- human and animal therapeutics and diagnostics (including clinical trial providers)
- medical devices and equipment
- research testing and medical laboratories
- microbes
- biotechnology.

Biotechnology: the 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. The following list of techniques was published by the OECD in 2004 as an interpretative guide as to what biotechnology includes:

- DNA – the coding: genomics, pharmaco-genetics, gene probes, DNA sequencing/synthesis/amplification, genetic engineering
- proteins and molecules – the functional blocks: protein/peptide sequencing/synthesis, lipid/protein glyco-engineering, proteomics, hormones, and growth factors, cell receptors/signalling/pheromones
- cell and tissue culture, and engineering: cell/tissue culture, tissue engineering, hybridisation, cellular fusion, vaccine/immune stimulants, embryo manipulation
- process biotechnologies: bioreactors, fermentation, bioprocessing, bioleaching, bio-pulping, bio-bleaching, biodesulphurisation, bioremediation, and biofiltration
- DNA and RNA vectors: gene therapy, viral vectors
- other: bioinformatics, nanobiotechnologies, other.

Statistics NZ business frame: a register of all businesses operating in New Zealand.

Enterprise: a legal business entity operating in New Zealand.

Research and development: the definition of R&D used in this survey is consistent with the recommendations contained in the OECD's *Frascati Manual 2002*. R&D performed by enterprises are generally investigative work that is of actual or potential use in the development of new or enhanced materials, products, devices, processes, or services. R&D directed towards duplicating work already developed by others is only included if the knowledge or technology required for the development is not available to the enterprise.

Rolling mean employment (RME): defines the number of employees of an enterprise. This is a 12-month rolling average of the monthly employment count figure. The employment count is obtained from taxation data.

Gross domestic product (GDP): is defined as the market value of all final goods and services produced within a country in a given period of time. It is also the sum of value added at every stage of production of all final goods and services produced within a country in a given period of time. Given that GDP data is provisional for a two-year period from the first release, the figures included in this report are provisional. Once updated figures are obtained, the GDP data and derived data based on GDP are revised. The revisions of this nature (as a result of changes external to the R&D dataset) are therefore not expressed in the report with a revision code, R alongside. The same logic is also used in expressing GDP and other data from the OECD's *Main Science and Technology Indicators (2012/2)* report.

Research and development indicator: response from respondents stating whether or not they carry out R&D activity.

Related links

Upcoming releases

Research and Development Survey: 2014 will be released in March 2015.

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[The release calendar](#) lists all our upcoming information releases by date of release.

Past releases

[Research and Development](#) has links to our previous releases.

Related information

[Our surveys](#) page has the questionnaires sent to respondents. For specific Research and Development Survey 2012 questionnaires follow the links below:

[Business questionnaire](#)

[Crown research institute questionnaire](#)

[Government questionnaire](#)

[Main science and technology indicators](#) has international comparisons.

[Ministry of Business, Innovation and Employment](#) has information on the survey's stakeholder.

Data quality

Period-specific information

This section contains information that has changed since the last release.

- [Reference period](#)
- [Target population](#)
- [Changes to the Research & Development Survey: 2012](#)
- [Summary of changes to the R&D population](#)
- [Response rates by industry](#)
- [Sampling error by industry](#)
- [Bioscience expenditure on R&D](#)

General information

This section contains information that does not change between releases.

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- [Measurement errors](#)
- [Analysis of results](#)
- [Imputation methodology](#)
- [Published sector and industry breakdowns](#)
- [Published industries](#)
- [Confidentiality and rounding](#)

Period-specific information

Reference period

The reference period for the latest survey was the 2011/12 financial year. Businesses with balance dates falling between 1 January and 30 September supplied data for the year ending 2012. Businesses with balance dates falling between 1 October and 31 December supplied financial data for the year ending 2011.

Target population

The target population is all economically significant enterprises that have been pre-identified as performing or funding R&D activities in New Zealand. See [Changes to the Research and Development Survey 2012](#).

Changes to the Research & Development Survey: 2012

Changes in the target population

The R&D Survey: 2012 featured a change in the target population from 'all economically significant enterprises that perform or fund R&D in New Zealand' to 'all economically significant enterprises that have been pre-identified as performing or funding R&D activities in New Zealand'.

There are a range of information sources available that allow us to identify R&D performers. These, combined with the last few iterations of this survey, have allowed us to build a consistent picture of the types of firms carrying out R&D in New Zealand. The changes made to the 2012 survey allow us to more intensively survey these businesses and create a better picture of individual R&D performers and their characteristics.

There were two main changes in identifying the population. The first was removing from the population any business that could not be pre-identified as being likely to perform R&D. This was partly offset by adding all businesses that applied for a grant from the Ministry of Science and Innovation (MSI) in the three years prior, rather than just those who received a grant over that time.

Break in the time series

The changes have caused a break in the time series, so 2012 results should not be compared directly with previous results. However, adjusted 2010 results have been modelled on the 2012 population criteria, to compare with the 2012 results. Care should be taken in interpreting the adjusted 2010 results.

Table 1 of the Excel tables (see the 'Downloads' box) shows the original 2010 results against the adjusted 2010 results. The difference is the level of break in the series.

Changes in the questionnaire

New categorical questions have been added to the R&D Survey sent to businesses. These questions ask about opportunities for expansion, the main reason the business carried out R&D, how long it takes a business to break even on its R&D investment, and what it expects to happen to its level of R&D over the next year.

Additional tables

A number of additional tables are available as Excel files (see the 'Downloads' box). Tables 1–5 have been published in previous R&D Survey releases, while tables 6–12 are new to this release.

Summary of changes to the R&D population

The sample for the R&D Survey: 2012 consisted of 3,444 enterprises, plus the eight universities and their commercial arms.

The target overall response rate for the R&D Survey: 2012 was 85 percent for business, government, and Crown research institutes (CRI). The target overall response rate for the higher education (universities) survey was 100 percent, which was achieved. The survey achieved an actual response rate of **88 percent**.

Some businesses were identified as key units if their response to a survey question was considerable in the previous survey period. The target response rate was 100 percent for businesses identified as key units. However, due to one unit qualifying for compassionate exclusion, 99 percent was achieved.

The sampling error on the total R&D expenditure figure has been measured at **1.5 percent** at the 95 percent confidence level.

There is **no sampling error** for the university sector due to the full coverage of this sector. The sampling error on the R&D expenditure figures at the 95 percent confidence level for the total business sector is **3.3 percent**; for the total government sector it is **0.4 percent**.

The table below provides a numerical summary of the changes in the R&D population, as well as associated changes in the sample, number of responders, and sampling errors.

Summary of changes to the R&D population			
Type of change	2010	2010 adjusted	2012
Population	Number		
Business	63,123	3,834	4,176
Government	302	123	111
Higher education	8	8	8
Total	63,435	3,963	4,296
Sample	Number		
Business	3,396	1,602	3,333
Government	300	120	111
Higher education	8	8	8
Total	3,705	1,728	3,447
Number of responders	Number		
Business	2,868	1,371	2,922
Government	282	117	99
Higher education	8	8	8
Total	3,159	1,494	3,030
Response rate⁽¹⁾	Percent		
Business	84	86	88
Government	94	96	89
Higher education	100	100	100
Total	85	86	88
Yes to R&D⁽²⁾	Number		
Business	816	744	1,491
Government	78	57	63
Higher education	8	8	8
Total	903	808	1,560
R&D performers as percentage of responders⁽³⁾	Percent		
Business	28	54	51
Government	28	49	64
Higher education	100	100	100
Total	29	54	51
Sample errors	Number		
Business	5.6	5.7	3.3
Government	0.4	1.7	0.4
Higher education	0.0	0.0	0.0
Total	2.3	2.3	1.5
1. Response rate = number of responders divided by sample.			
2. 'Yes to R&D' means that a business is carrying out and/or funding R&D.			
3. R&D performers as percentage of responders = 'yes to R&D' divided by number of responders.			

4. Due to rounding some figures may not add to stated totals.

The population has reduced significantly from 2010 to 2012, due to the change in target population. Only businesses that are pre-identified as carrying out R&D are included. The sample size and response rate have remained relatively stable from 2010 to 2012, but the number of responders answering 'yes' to R&D has increased significantly, from 816 in 2010, to 1,491 in 2012. This is expected, as the businesses pre-identified as carrying out R&D are being surveyed more intensively.

Sampling errors have reduced significantly from 2010 adjusted to 2012 for the business sector and overall R&D. The main cause of this is that a much higher proportion of the business sector population was sampled in 2012.

Response rates by industry

The table below shows response rates by industry within the business sector. The response rates were very consistent at this level, ranging from 83 percent for beverage and tobacco manufacturing, to 92 percent for food product manufacturing and metal product manufacturing.

Response rates by industry – business sector	
2012 reference year	
Published industry	Response rate (percent)
Primary	84
Food product manufacturing	92
Beverage and tobacco manufacturing	83
Textiles, clothing, footwear, and leather manufacturing	90
Petroleum, coal, chemical, and associated product manufacturing	88
Non-metallic mineral product manufacturing	87
Metal product manufacturing	92
Machinery and equipment manufacturing	91
Other manufacturing	87
Manufacturing	90
Wholesale trade	87
Scientific research and technical services	90
Computer services	86
Other services	87
Services	87
Total business sector	88

Sampling error by industry

The table below shows the business sector sampling error on R&D expenditure by published industry. These sample errors need to be taken into account when using data at published industry level.

Sample error by industry – business sector	
2012 reference year	
Published industry	Sample error (percent)
Primary	5.5
Food product manufacturing	8.0
Beverage and tobacco manufacturing	17.6
Textiles, clothing, footwear, and leather manufacturing	13.0
Petroleum, coal, chemical, and associated product manufacturing	6.3
Non-metallic mineral product manufacturing	11.9
Metal product manufacturing	5.5
Machinery and equipment manufacturing	8.9
Other manufacturing	15.6
Manufacturing	5.3
Wholesale trade	6.4
Scientific research and technical services	6.4
Computer services	9.3
Other services	9.0
Services	5.0

The survey sample was designed to minimise sample error at sector level. At published industry level, sample errors are higher, due to the smaller numbers in each of these groups.

Bioscience expenditure on R&D

Bioscience is the development and application of knowledge of the way plants, animals, and humans function for the development of products and services. Bioscience has applications in diverse fields such as health, animal and plant breeding, food manufacturing, and aquaculture.

Respondents to the survey are asked whether any of their expenditure on internal R&D is attributable to bioscience. This is reported in table 11 of the Excel tables (see the 'Downloads' box). Within that table, the total amount of bioscience attributable to R&D is reported.

This total (\$495 million) in 2012, cannot be compared with expenditure from Statistics NZ's Bioscience Survey, for the following reasons:

- The R&D Survey only includes bioscience that forms part of a business's R&D. The Bioscience Survey includes non-R&D expenditure.
- The R&D Survey collects information from pre-identified R&D performers. The Bioscience Survey collects expenditure information from businesses whose main activity is bioscience. While some businesses will respond to both surveys, there are many in one but not the other.

General information

Survey background

The Research and Development Survey: 2012 (R&D Survey: 2012) was jointly developed by Statistics NZ with the Ministry of Science and Innovation (MSI). From 1 July 2012, MSI has become part of the Ministry of Business, Innovation, and Employment (MBIE).

The R&D Survey measures the level of R&D activity, employment, and expenditure by businesses, government departments, government-owned trading entities, and higher education (universities). The R&D Survey is conducted every two years by Statistics NZ. Results from surveys before 2002 were released by the Ministry of Research, Science, and Technology (MoRST), which was amalgamated with the Foundation of Research, Science, and Technology in February 2011 to create MSI.

This is the first release of data from the R&D Survey: 2012. A full report will be released in June 2013. The report will go into further detail on business, government, and higher education R&D activity, as well as focus on the scientific research industry.

Data collection

The R&D Survey is a postal survey consisting of four questionnaires: a business questionnaire, a government questionnaire, a CRI questionnaire, and a higher education (universities) questionnaire. These questionnaires are specifically designed to capture data on R&D from these different organisation types.

The business, government, and CRI questionnaires were posted out in mid-August 2012. Information collected included:

- the number of personnel within an enterprise working on R&D
- current and capital expenditure on R&D
- expenditure by type of R&D
- source of funds for R&D carried out
- the area of application of the R&D.

Information was requested for the last financial year within the 12 months ending 30 September 2012.

The higher education (universities) questionnaire was also sent in August 2012. Data was collected for the year ended 31 December 2011. The higher education (universities) questionnaire was designed to allow universities to use financial information that is generally produced for annual reporting purposes. This means that a number of data items for universities' R&D were produced using modelled information. Universities New Zealand – Te Pōkai Tara assisted Statistics NZ in the determination of these modelling specifications. Information collected included university discretionary income, internal and external research funding, academic staff salaries, university operating expenditure by faculty, and R&D personnel data.

Survey population

Enterprises (business, government, and CRI) are included in the R&D Survey population if they:

- are economically significant and active on the Statistics NZ Business Frame
- are not classified to ANZSIC06 codes 'G', 'H', 'I', or 'P'
- are a university
- fulfil one or more of the following indicators of R&D activity:
 - enterprises indicating they undertook R&D in the Annual Frame Update Survey (AFUS)
 - enterprises applying for funding from the Ministry of Science and Innovation (and its predecessor agencies) in 2010, 2011, or 2012

- enterprises applying for patents in the last two years
- enterprises recording R&D activity in the 2011 Business Operations Survey or the previous two R&D Surveys (only from full coverage strata)
- enterprises recording R&D activity in the 2011 Bioscience Survey.

The exclusion of ANZSIC division codes 'H' (accommodation and food services), 'G' (retail trade), and 'I' (transport, postal and warehousing) is due to the previous equivalents of these industries showing little or no contribution to the total reported expenditure on R&D in the 2002 survey. Such contributions were considered too small to justify their inclusion in the survey population so the equivalent industries have been excluded since the R&D Survey: 2004. ANZSIC division 'P' (education and training) has been excluded, with the exception of universities, who perform the vast majority of R&D in this industry.

Sample design

The R&D Survey uses a stratified sample in its sample design. Strata were developed based on industries defined by their sector (ie business, government, or higher education (universities)) and ANZSIC06.

Substrata were then developed using RME and annual GST from the Statistics NZ Business Frame. These are both captured from tax data.

Some of these substrata were made full coverage, meaning that all enterprises in the substratum were selected for the survey. Within the full coverage substrata, keys were identified for intensive attention in the data collection phase. Keys are enterprises that made significant R&D expenditure in 2010.

Measurement errors

The R&D Survey results are subject to measurement errors. These need to be considered when analysing the results from the survey.

Measurement errors include mistakes by respondents when completing the questionnaire, variation in respondents' interpretation of the questions asked, and errors made during the processing of the data. In addition, the survey applies imputation methodologies to cope with non-respondents and item non-response (see [Imputation methodology](#) for more detail). These methods are not without error.

Statistics NZ adopts procedures to minimise these types of errors, but they may still occur and are not quantifiable.

Given the nature of the data collected, there are limitations on the level of accuracy that can be expected from the R&D Survey. Many respondents do not keep a separate account of their R&D expenditure, or they may include R&D with other scientific and technological services, such as consulting.

Analysis of results

The R&D Survey results have been compared with annual reports and other indicators published by Statistics NZ. Where the survey results differed substantially, more detailed study of the data was made.

Imputation methodology

This section gives an outline of the imputation methodology used in the R&D Survey: 2012 (business, government, and CRIs). No unit non-response was required for the R&D higher education (universities) survey, as a 100 percent response rate was achieved.

Unit non-response

Unit (or complete) non-response occurs where units in the population do not return the questionnaire, or an invalid questionnaire is received. A weight adjustment method is used to rate up the responding firms to compensate for the non-responding firms within the same estimation cell. The data from responding firms are multiplied by the inverse of the response rate for the estimation cell.

Any enterprises that cease operation during the survey period are removed from the weight calculations.

Item non-response

Item (or partial) non-response is where units return the questionnaire but fail to provide data for selected aggregates.

Item non-response imputation was applied to breakdowns where a total could be sourced from another question and personnel questions where data was not provided. The item non-response imputation method then used the mean proportion of all responding linked units (excluding outliers) within the item non-response estimation cell, and applied these proportions to the sourced total. For personnel questions the totals were imputed using a similar method.

Published sector and industry breakdowns

The published sector and industry breakdowns provided in this release have been created using recommendations from the OECD's *Frascati Manual 2002* to allow for greater international comparability.

This manual recommends that state-owned enterprises (Business Type 1996 classification) be classified to the business sector. In addition, the *Frascati Manual 2002* recommends that the industrial classification code for significant research organisations be changed to the industry they predominantly serve. The industry breakdowns have been applied using the Australian and New Zealand Standard Industrial Classification 2006 (ANZSIC06).

Business sector

Includes central and local government-owned trading enterprises and all other enterprises with the following New Zealand Institutional Sector 1996 codes.

Business sector institutional codes	
NZISC96 code	Description
1331 ⁽¹⁾	Central government enterprises
1321 ⁽¹⁾	Local government enterprises
1111	Private corporate producer enterprises
1121	Private non-corporate producer enterprises
1211	Producer boards
2211	Private registered banks
2221	Private other broad money (M3) depository organisations
2291	Private other depository organisations
2311	Private other financial organisations except insurance and pension funds
2411	Private insurance and pension funds
4	Private non-profit organisations serving households
1. Central and local government trading enterprises are included in business sector.	

Government sector (excluding universities)

The government sector excludes the eight universities, and central and local government trading enterprises, and includes all enterprises with the New Zealand Institutional Sector Classification 1996 (NZISC96) codes included in the table below.

Government sector institutional codes	
NZISC96 code	Description
1331 ⁽¹⁾	Central government enterprises
1321 ⁽¹⁾	Local government enterprises
2111	Central bank
2212	Central government registered banks
2213	Local government register banks
2222	Central government other broad money (M3) depository organisations
2223	Local government other broad money (M3) depository organisations
2292	Central government other depository organisations nec
2293	Local government other depository organisations nec
2312	Central government other financial organisations except insurance and pension funds
2313	Local government other financial organisations except insurance and pension funds
2412	Central government insurance and pension funds
2413	Local government insurance and pension funds
3	General government (excluding universities)
1. Central and local government trading enterprises are included in business sector.	

Higher education (universities)

The higher education (universities) sector includes the eight New Zealand universities that are members of Universities New Zealand – Te Pōkai Tara. These are classified to NZISC96 code 3111 (central government excluding funded social security), with an ANZSIC06 code of P810200 (higher education).

Included within the higher education sector are universities' commercial arms. Prior to 2010, they were represented in the business sector.

Feasibility studies conducted by Statistics NZ and MBIE have found there is an insignificant amount of R&D being carried out in other higher education institutions (for example, polytechnic institutes). Therefore, they have been excluded from the survey.

Published industries

The published industries within the business sector have been based on ANZSIC06 classification, apart from the reclassification of significant scientific research organisations (M691) to the industry they predominately serve and the inclusion of local and state-owned trading enterprises. Published industries are listed below, followed by their ANZSIC06 codes.

Business sector

Primary industries – A and B

Food product manufacturing – C11

Beverage and tobacco manufacturing – C12

Textile, clothing, footwear, and leather manufacturing – C13

Petroleum, coal, chemical, and associated product manufacturing – C17, C18, and C19

Non-metallic mineral product manufacturing – C20

Metal product manufacturing – C21 and C22

Machinery and equipment manufacturing – C23 and C24

Other manufacturing – C14, C15, C16, and C25

Wholesale trade – F

Scientific research and technical services – M691 and M692 (excluding M6924)

Computer services – M70

Other services – D to S excluding (F, M691, M6921, M6922, M6923, M6925, M70)

Government sector

Scientific research – M691

Other government research – All ANZSIC codes except M691

Higher education (universities) sector

Total universities, including their commercial arms.

Confidentiality and rounding

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On occasion, figures are rounded to the nearest thousand or some other convenient unit. This may result in a total disagreeing slightly with the total of the individual items shown in tables. Where figures are rounded, the unit is generally expressed in words below the table headings, but where space does not allow this the unit may be shown as, for example, (000) for thousands.

All counts of businesses in this report have been randomly rounded to base 3 to protect the confidentiality of respondents. Totals are rounded independently of the components, so not all components will add to the stated totals. All counts of personnel have been rounded using a graduated random rounding approach. Again, not all components will add to the stated totals.

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Revisions

Some figures from the Research and Development Survey 2010 have been revised in this information release.

Minor revisions were made at the unit record level in the following:

- business expenditure on R&D
- higher education expenditure on R&D
- higher education personnel.

Revisions were made due to updated information becoming available from survey respondents and other non-survey data.

Revisions are marked with an 'R' in the downloadable Excel tables.

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Tables

The following tables are available in Excel format from the 'Downloads' box. If you have problems viewing the files, see [opening files and PDFs](#).

1. Research and development expenditure by sector and published industry
2. Research and development expenditure as a proportion of GDP by sector
3. Research and development expenditure by source of funds and recipient sector
4. Research and development expenditure by purpose of research and sector
5. Type of research and development expenditure by sector
6. What businesses in the Research and Development Survey want to spend more time and money on, business sector by published industry
7. What businesses in the Research and Development Survey most want to spend more time and money on, business sector by published industry
8. Main reason businesses carry out and fund research and development, business sector by published industry
9. Expected time for businesses to break even on research and development, business sector by published industry
10. Expectation of own firms' research and development for the next year, business sector by published industry
11. Bioscience research and development carried out by sector and published industry
12. Personnel involved in research and development by occupation