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Industrial Research and Development: Intentions



2015



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Industrial Research and Development: Intentions

2015

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- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- p preliminary
- r revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- E use with caution
- F too unreliable to be published
- * significantly different from reference category ($p < 0.05$)

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Highlights

Businesses in Canada anticipate spending \$15.5 billion to perform research and development (R&D) in 2015, down 2.6% from 2014's intentions of \$15.9 billion, and 3.6% lower than 2013's actual expenditures of \$16.0 billion.

The manufacturing sector is anticipated to spend \$6.4 billion in 2015, or 42% of all industrial R&D. Manufacturing R&D performance remains well below its 2001 peak of \$9.2 billion.

Service industries are anticipated to spend \$7.3 billion or almost half (47%) of all industrial R&D in 2015. The most recent peak in R&D spending in service industries was \$7.6 billion in 2011. R&D performance in the service industries has stabilized since then.

R&D spending in mining, quarrying and oil and gas extraction is anticipated to be \$1.4 billion in 2015, down \$246 million from its most recent peak of \$1.6 billion in 2012. Businesses in agriculture, forestry, fishing and hunting, the utilities and construction industries are forecast to perform the remaining \$380 million of industrial R&D.

Businesses in Canada spent \$2.0 billion on energy-related R&D in 2013, unchanged from 2012. Fossil fuel-related R&D performance accounted for over two-thirds of all energy-related R&D in 2013 at \$1.4 billion, down slightly from \$1.5 billion in 2012. R&D for energy efficiency related technologies increased to \$128 million in 2013, up from \$80 million in 2012.

In 2013, the top four fields of technology—electrical engineering, electronic engineering and information technology (\$3.5 billion), other engineering and technology (\$2.7 billion), software engineering (\$2.6 billion) and mechanical engineering (\$2.0 billion)—accounted for two-thirds of all industrial R&D in Canada.

Most industrial R&D is performed by scientists and engineers, who are assisted by technical and support staff. In 2013, R&D professionals consisting of scientists, engineers and R&D administrators, numbered 89,165 full-time equivalents (FTEs), and made up two-thirds (67%) of industrial R&D personnel. Technicians and technologists—technically trained personnel who support the activities of scientists and engineers—accounted for 33,551 full-time equivalents, while other support personnel constituted the remaining 9,615 full-time equivalents.

While Ontario and Quebec continue to account for the majority of industrial R&D performed in Canada, their combined share declined slowly but steadily from 2000 to 2013, from \$10.5 billion or 85%, to \$11.7 billion or 73%. In these two provinces, the majority of industrial R&D has historically been performed in the manufacturing sector. Declines in manufacturing R&D, mostly in Ontario, mirror the declines in the overall share of R&D performed in Quebec and Ontario.

R&D performed in Alberta and British Columbia, increased during this period; from \$583 million in 2000 to \$2.0 billion in 2013 in Alberta and from \$973 million in 2000 to \$1.6 billion in 2013 in British Columbia. In 2000, the four western provinces accounted for \$1.8 billion or 14% of industrial R&D but, by 2013, these four provinces accounted for \$4.1 billion, or 26%. This shift paralleled the growing importance of R&D in the oil and gas extraction industry in Alberta and the focus on R&D in service industries in British Columbia.

Between 2000 and 2013, Atlantic Canada has also seen its industrial R&D spending grow from \$132 million to \$222 million, but it remains a comparatively small share (1%) of total industrial R&D in Canada in 2013.

Analysis

Industrial intramural R&D spending down in 2015

Businesses in Canada anticipate spending \$15.5 billion on intramural research and development (R&D) in 2015, down 3.6% from 2013 actual expenditures of \$16.0 billion. Annual expenditures on industrial R&D peaked most recently in 2011 at \$16.9 billion, but have declined each year since then.

Businesses perform R&D to create and commercialize new technology, products, and processes. Industrial intramural R&D is composed of two categories: current and capital R&D spending.

Current R&D spending of \$14.2 billion will account for 92% of industrial R&D spending in 2015, a relatively stable share since 2003. Wages and salaries are anticipated to total \$9.6 billion in 2015 and constitute the largest component of R&D expenditures. The remaining current costs, such as the purchase of non-capital materials, contracts for on-site consultants, and products to support R&D, are forecast to receive \$4.6 billion.

Spending on R&D capital, such as machinery, equipment, land, and buildings, is anticipated to be \$1.3 billion, or 8% of total industrial R&D spending in 2015.

In 2013, the most recent year for which these data are available, the majority of the funds directed towards industrial R&D, were from the performing businesses, \$12.8 billion. From 2000 to 2013, the share of R&D spending funded by the reporting companies has grown from 66% to 80%. Foreign financing constituted the second largest source of funds for industrial R&D ranging from 28% in 2000 to 11% (or \$1.7 billion) in 2013. Government funding has ranged from 2% to 4% over the period, amounting to \$674 million in 2013.

In 2008, 63% of industrial R&D was performed by Canadian-controlled businesses down from 70% in 2000. During this period, there was a shift towards foreign-controlled businesses performing R&D in Canada. After 2008, there was a redirection towards R&D performance by Canadian-controlled businesses that ended in 2012.

In 2013, 89,165 full-time equivalent (FTE) R&D professionals, consisting of scientists, engineers and R&D administrators, made up two-thirds (67%) of industrial R&D personnel. Technicians and technologists—technically trained personnel who support the activities of scientists and engineers—accounted for 33,551 full-time equivalents and other support personnel comprised the remaining 9,615 full-time equivalents.

Since 2008, the number of industrial R&D personnel fell from 172,744 full-time equivalents to 132,331 in 2013. Notable decreases in the number of R&D technical and support staff which together dropped 42% between 2008 and 2013 have driven this overall decline. The number of full-time equivalent scientists and engineers dropped less than 10% in the same period. This shift towards up-skilling R&D positions explains, in part, why wages and salaries at \$9.7 billion for R&D performance in 2013 have continued to be over 60% of total intramural R&D expenditures.

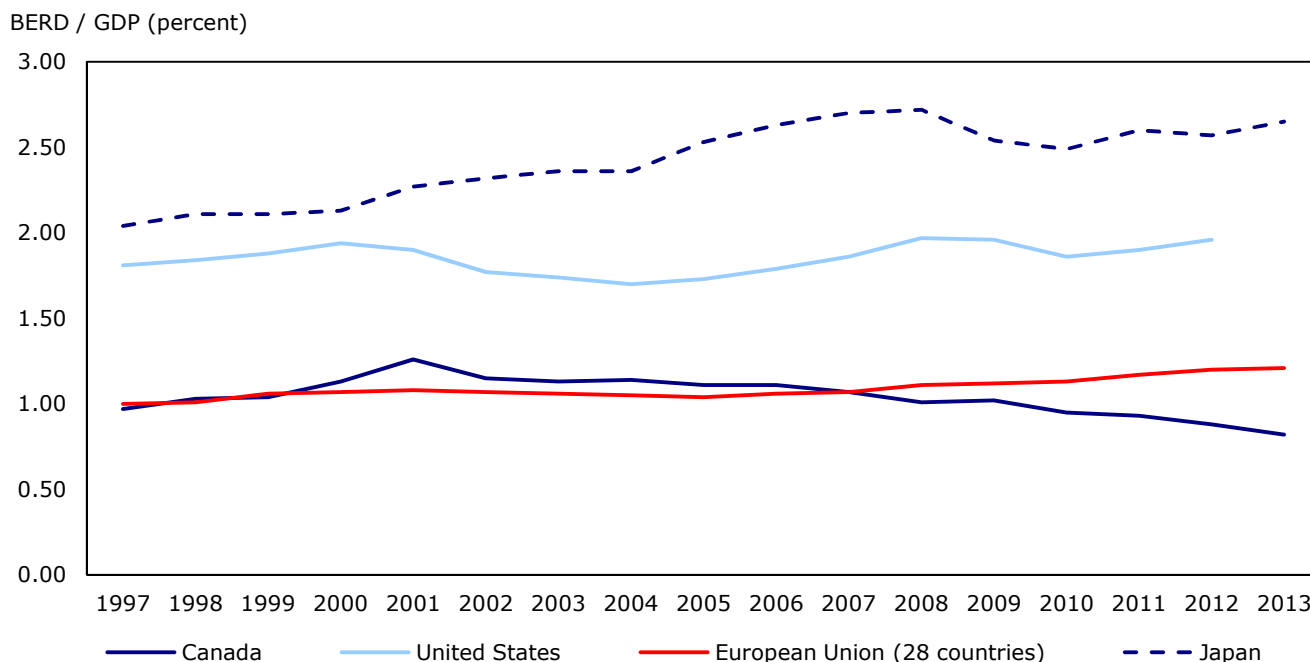
Canada's industrial intramural R&D intensity declines

Business enterprise expenditure on research and development (BERD) to gross domestic product (GDP) ratio is the international measure of the intensity of R&D spending in the business sector. Since 2008, this ratio has generally declined, both in absolute terms and in relation to the intensity of business R&D spending in other major industrial economies.

After peaking at 1.26% in 2001, Canada's BERD-to-GDP ratio declined steadily during the 2000s, to its most recent low of 0.82% in 2013. Between 1997 and 2009, the BERD ratio in the United States averaged 1.84%, while in Canada it averaged 1.09%. Since 2010, Canada's BERD-to-GDP ratio has averaged 0.90%, compared to 1.91% in the United States.

Chart 1

BERD as a percentage of GDP, Canada, United States, European Union and Japan, 1997 to 2013



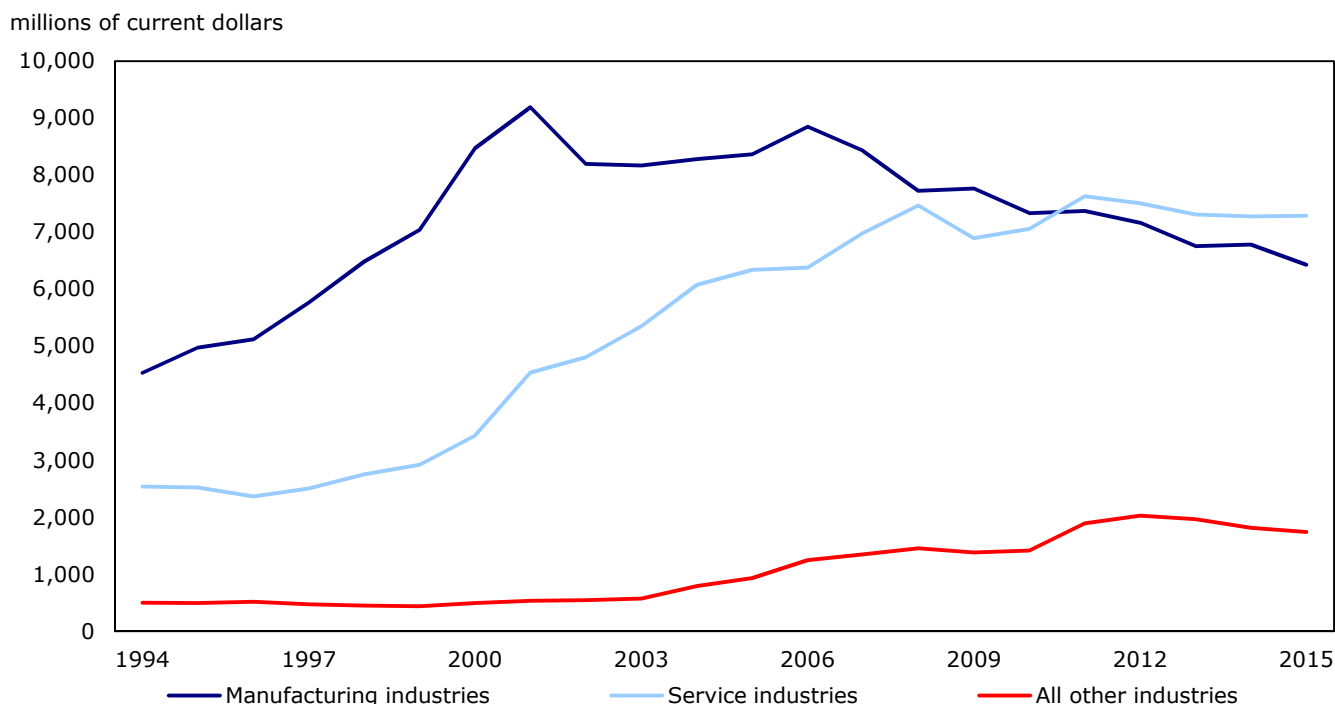
Note: The data is not available for the United States in 2013.

Source: Main Science and Technology Indicators, OECD (2015).

From manufacturing to energy: Major developments in Canadian industrial intramural R&D spending

The R&D performance of manufacturing industries peaked at \$9.2 billion in 2001, but declined in 2002, when the output of information and communications technology (ICT) goods-producing industries contracted. Manufacturing R&D has declined \$2.8 billion from its peak in 2001 to its forecast R&D spending of \$6.4 billion in 2015. The decline in R&D spending by ICT goods-producing industries from their peak of 2001 equals the net decline between 2001 and 2015 within manufacturing.

Chart 2
Industrial R&D spending by industry sectors, 1994 to 2015



Source: CANSIM table 358-0024.

The rise and fall of R&D spending in selected manufacturing industries, 2000 to 2015

Communications equipment manufacturing, a large component of ICT manufacturing, was the largest R&D performing industry in Canada, from 1999 to 2008. Peaking in 2001, at \$3.2 billion, intramural R&D spending in communications equipment manufacturing declined steadily to \$1.4 billion in 2005. With the exception of a low of \$1.1 billion in 2010, it largely remained in the range of \$1.3 billion to \$1.5 billion, from 2005 through 2014. Communications equipment manufacturing R&D spending is forecast to decline to \$939 million in 2015.

Aerospace products and parts manufacturing showed steady increases through the 2000s, from \$860 million in 2002 to \$1.6 billion in 2013, and is forecast to be just under this new peak through 2015 (\$1.5 billion).

Pharmaceuticals and medicine manufacturing dedicated \$1.2 billion to intramural R&D in 2002 with this level of investment subsequently declining by more than one-half, to an anticipated \$441 million in 2015.

Semi-conductor and other electronic components manufacturing performed \$872 million of R&D in 2001, but, by 2015, is anticipated to spend only \$429 million.

Motor vehicle and parts manufacturing R&D peaked at \$657 million in 2004, but has since declined to an anticipated \$253 million in 2015.

Service industries outspend manufacturing on R&D

Intramural R&D expenditures in service industries were less than one-half the amount reported in manufacturing as recently as 2001, but they grew steadily every year, from \$2.5 billion in 1997 to \$7.5 billion in 2008. This growth was due to industrial reclassification of larger businesses into service industries, increased intramural R&D spending by ongoing R&D performers, and new R&D performers. In 2009 the R&D spending in service industries contracted and returned to its most recent peak of \$7.6 billion in 2011. Since 2011, the level R&D spending by service industries has exceeded that of the manufacturing sector, to a forecast \$7.3 billion in 2015.

Since 2004, intramural R&D spending in ICT services has exceeded that of ICT manufacturing. While R&D in ICT manufacturing declined after 2001, R&D in ICT services increased every year from 2000 through 2008, more than doubling from \$1.4 billion to \$3.1 billion. Thereafter R&D spending in ICT services has remained in the range of \$3 billion and is anticipated to continue at this level through 2015 (\$3.1 billion).

Part of ICI services, computer system design and related services, known for developing custom software applications for their own use or for other organizations, experienced strong growth in intramural R&D spending in the two years preceding 2000 or 'Y2K'. In 2001, R&D spending on computer system design and related services surpassed \$1.0 billion to peak a decade later, in 2011, at \$1.6 billion, with 2015 preliminary R&D spending intentions of \$1.4 billion.

Amongst all industries, intramural R&D spending has grown the most in scientific R&D services between 1997 and 2015. Businesses in this industry are dedicated to performing R&D on their own account or under contract for other organizations—in which it is a leader among all industries. In 1997, R&D spending by scientific R&D services was \$211 million, peaking at \$2.0 billion in 2011. It is anticipated that spending by scientific R&D services will continue to perform \$1.8 billion in R&D from 2013 through 2015.

R&D in wholesale trade experienced the second most rapid increase in the 2000s—after scientific R&D services. In wholesale trade, there are many foreign-controlled multinationals whose global activities span goods production and services provision. R&D by the wholesale trade sector occurs across a wide range of fields of science or technology, from basic and clinical medicine to electrical, electronic, software, mechanical and materials engineering and information technology. A large R&D-performing industry at—\$556 million in 1997, spending increased to \$1.4 billion by 2008, and is anticipated to be \$1.3 billion in 2015.

R&D spending in mining, quarrying and oil and gas extraction industry up since 2000

R&D spending in mining, quarrying and oil and gas extraction is anticipated to be \$1.4 billion in 2015, down \$246 million from its most recent peak of \$1.6 billion in 2012. R&D performance in mining, quarrying and oil and gas extraction grew rapidly from \$182 million in 2000 to \$980 million in 2008. With a slight contraction to \$929 million in 2009, R&D spending in mining, quarrying and oil and gas recovered to its 2008 level by 2010, and continued its growth, peaking at \$1.6 billion in 2012.

R&D for energy-related technologies

R&D expenditures on energy-related technologies have grown since the onset of the commodities boom in the early 2000s. Between 2009 and 2013, R&D spending on energy-related technologies increased from \$1.3 billion to \$2.0 billion. These increases have been largely due to increases in R&D for fossil fuel technologies, which grew from \$928 million to \$1.4 billion during this period. Fossil fuel-related R&D accounted for over two-thirds (71%) of all energy-related R&D in 2013, the most recent year for which data are available.

R&D expenditures for other energy-related technologies have shifted since 2009, with increases in spending on nuclear energy R&D (from \$18 million to \$77 million), energy efficiency (from \$68 million to \$128 million), and "other energy-related technologies" (from \$68 million to \$110 million). R&D related to hydrogen and fuel cells shifted from predominantly hydrogen-related technologies (\$44 million of \$60 million total in 2009) to mostly fuel cell-related technologies (\$60 million of \$74 million total in 2013).

Geographically, industrial R&D spending is concentrated in Ontario and Quebec

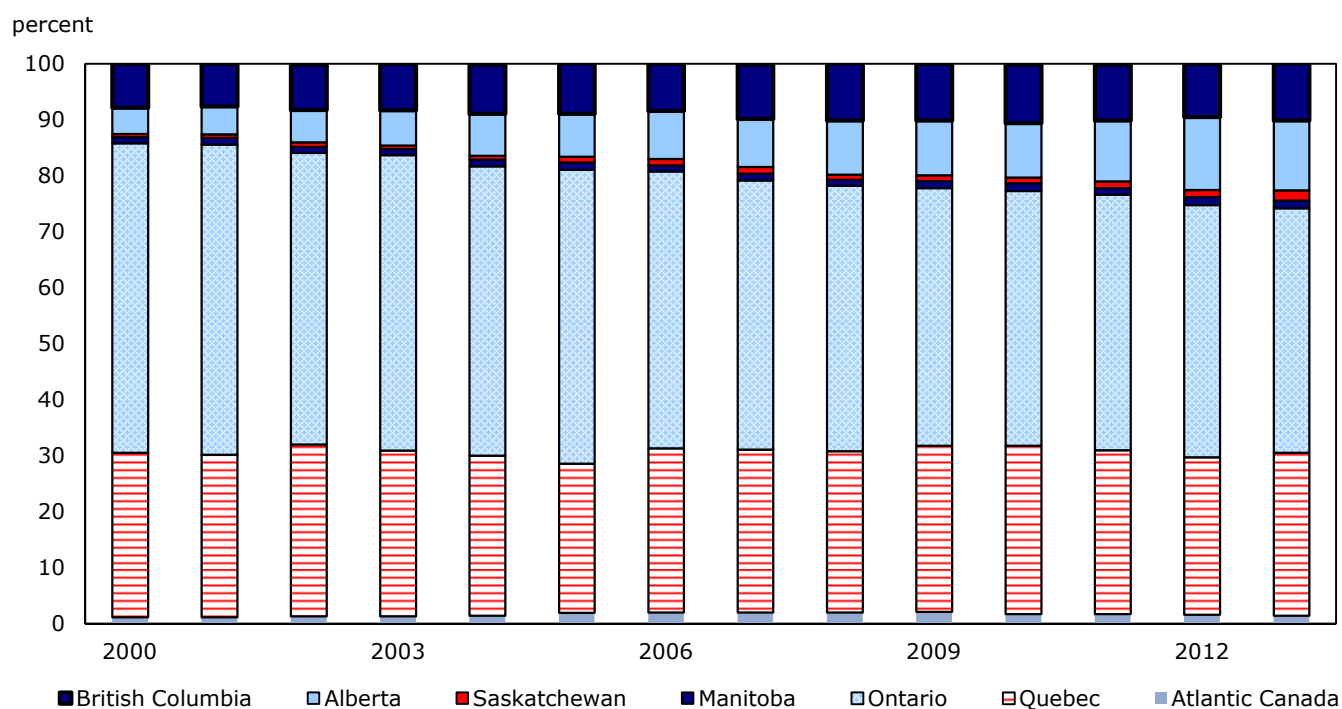
While Ontario and Quebec continue to account for the majority of industrial R&D performed in Canada, their combined share declined slowly but steadily from 2000 to 2013, from \$10.5 billion or 85%, to \$11.7 billion or 73%. In these two provinces, the majority of industrial R&D has historically been performed in the manufacturing sector. Declines in manufacturing R&D, mostly in Ontario, mirror the declines in the overall share of R&D performed in Quebec and Ontario.

R&D performed in Alberta and British Columbia, increased during this period; from \$583 million in 2000 to \$2.0 billion in 2013 in Alberta and from \$973 million in 2000 to \$1.6 billion in 2013 in British Columbia. In 2000, the four western provinces accounted for \$1.8 billion or 14% of industrial R&D but, by 2013, these four provinces accounted for \$4.1 billion, or 26%. This shift paralleled the growing importance of R&D in the oil and gas extraction industry in Alberta and the focus on R&D in service industries in British Columbia.

Between 2000 and 2013, Atlantic Canada has also seen its industrial R&D spending grow from \$132 million to \$222 million, but it remains a comparatively small share (1%) of total industrial R&D in Canada in 2013.

Chart 3

Share of total industrial R&D in Canada, by region and province, 2000 to 2013



Source: CANSIM table 358-0161.

Industrial R&D spending focused on engineering and technology

In 2013, engineering and technology R&D accounted for \$12.9 billion (80%) of industrial R&D performed. Natural and formal sciences and medical and health sciences each accounted for 9%, while agricultural sciences comprised the remaining 3%. Since 2009, when these data became available, most industrial R&D has focused on engineering and technology. The share of industrial R&D in these fields increased from 71% in 2009, to 80% in 2013. In contrast, R&D in the major science fields (natural and formal sciences, agricultural sciences and medical sciences) has declined from \$4.6 billion to \$3.1 billion.

Within engineering and technology, the top four detailed fields: electrical engineering, electronic engineering and information technology (\$3.5 billion); other engineering and technology (\$2.7 billion); software engineering (\$2.6 billion); and mechanical engineering (\$2.0 billion) together accounted for two-thirds (67%) of all industrial R&D in Canada in 2013.

Electrical and electronic engineering and information technology led industrial R&D spending from 2009 to 2013

Electrical and electronic engineering and information technology has led industrial R&D activities from 2009 to 2013. This field of technology encompasses a broad range of objectives, including telecommunications, flight instruments, computer systems and electrical circuits; engineering related to power generation, transmission and design of related equipment; design of control systems that monitor performance and integrate feedback into the system; signal processing, such as signal compression, error detection and error correction. In 2013, these expenditures accounted for \$3.5 billion of performed R&D or 22% of total industrial intramural R&D in Canada.

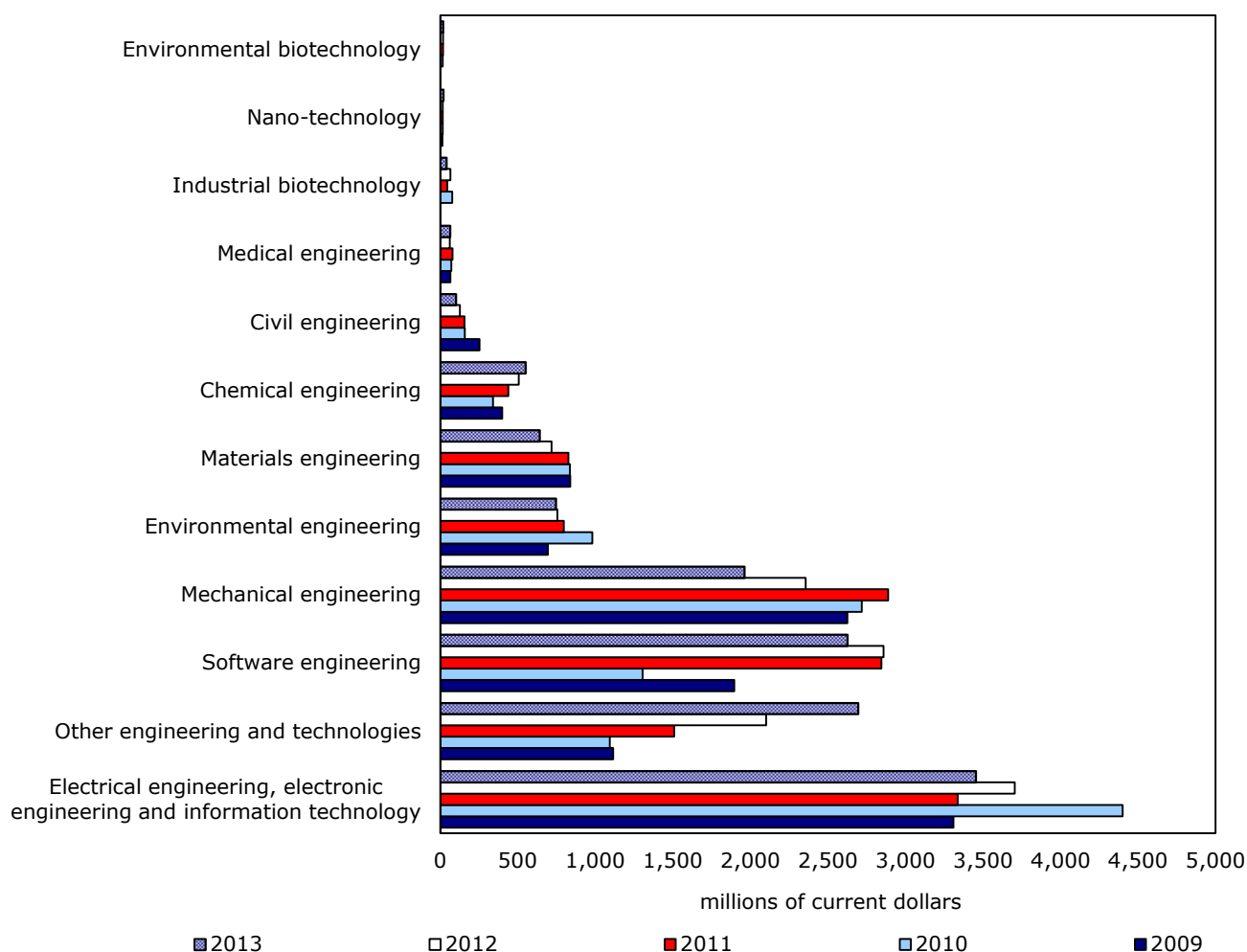
Software engineering, the second-largest field of technology at \$2.6 billion in 2013, is the application of systematic, disciplined and quantifiable approaches to the development, operation and maintenance of software. Software engineers perform R&D activities related to computer programming, computer systems, and integration of software into physical systems. This field of technology has grown from \$1.9 billion in 2009 to \$2.6 billion in 2013, however, this increase has been mirrored by decreases in R&D spending in computer and information sciences (down from \$1.4 billion in 2009 to \$581 million in 2013)

R&D in mechanical engineering involves exploring the boundaries of materials, machines and systems to produce safer, less expensive and more efficient machines and mechanical systems. Mechanical engineering R&D expenditures increased between 2009 (\$2.6 billion) and 2011 (\$2.9 billion), but subsequently declined in 2012 and 2013 (\$2.4 billion and \$2.0 billion respectively).

Emerging technologies such as biotechnology and nanotechnology accounted for a smaller share of industrial R&D (3%), with biotechnology as the leader in R&D spending at \$386 million. Nanotechnology remains a specialized area of industrial R&D, ranging from \$13 million to \$18 million during the period from 2009 to 2013.

There are four detailed fields of technology dedicated to biotechnology: medical biotechnology (\$295 million in 2013), industrial biotechnology (\$38 million), agricultural biotechnology (\$36 million) and environmental biotechnology (\$17 million). Medical biotechnology accounted for three-quarters (76%) of biotechnology R&D performed by businesses in 2013.

Chart 4
Industrial R&D expenditures - Engineering and technology, 2009 to 2013



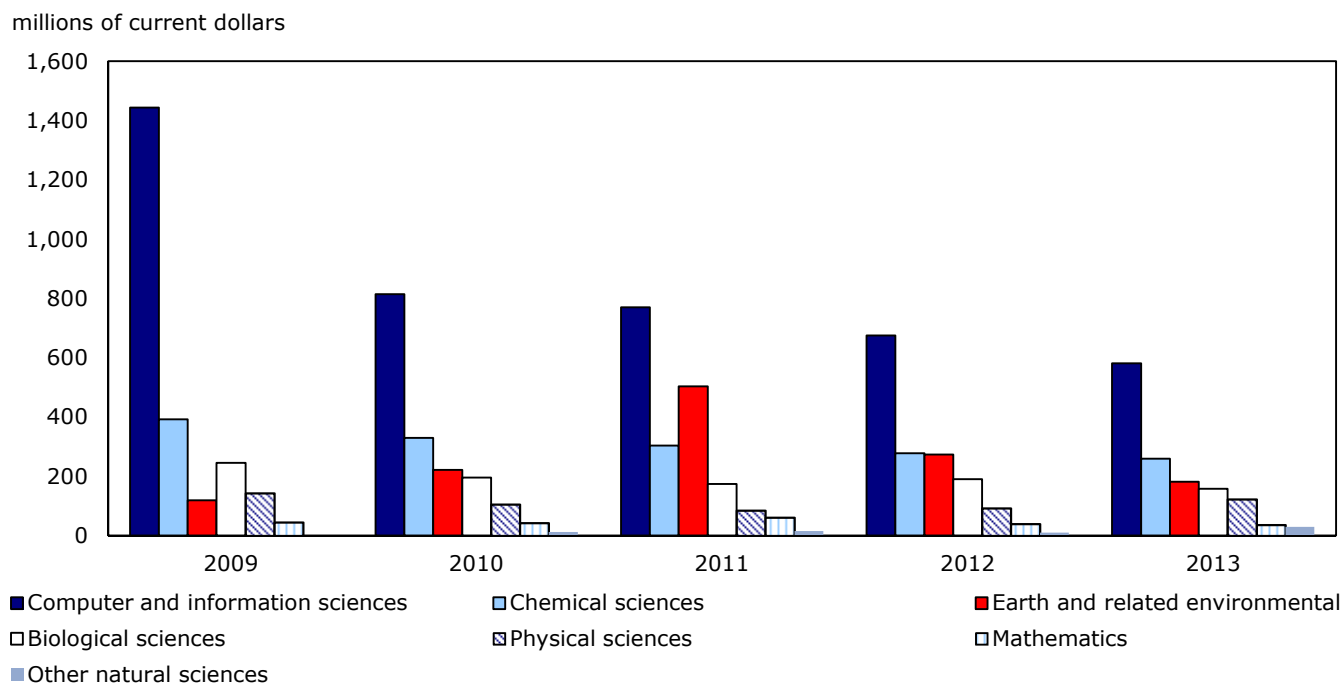
Note: Suppressed to meet the confidentiality requirements of the *Statistics Act*.

Source: CANSIM table 358-0140.

Computer and information sciences remained the most important natural and formal science for industrial R&D

Natural and formal sciences accounted for 9% of industrial R&D expenditures in 2013. Computer and information sciences accounted for the largest share of natural and formal sciences. In 2009, it accounted for \$1.4 billion of all natural and formal sciences R&D but, by 2013, it had fallen to \$581 million. R&D in physical, chemical and biological sciences together accounted for \$539 million in 2013, with chemical sciences (\$259 million) representing the largest share of these sciences.

Chart 5
Industrial R&D expenditures - Natural and formal sciences, 2009 to 2013



Note: The data for Other natural sciences for 2009 is too unreliable to be published.

Source: CANSIM table 358-0140.

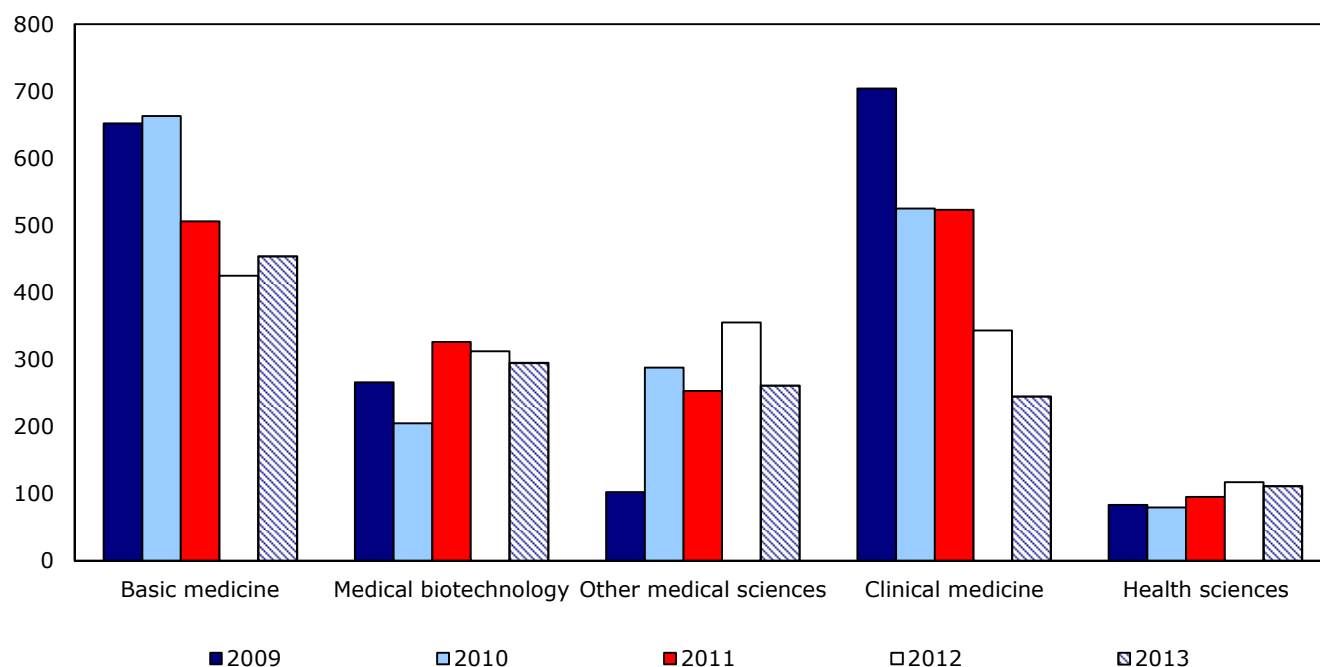
Overall medical and health sciences industrial R&D spending down since 2009

Spending on medical and health sciences R&D declined each year from 2009 to 2013, from \$1.8 billion in 2009 to \$1.4 billion in 2013. The leading industry performing medical and health sciences R&D continued to be scientific R&D services at \$498 million or 37% in 2013, followed by wholesale trade at \$362 million and pharmaceutical and medicine manufacturing at \$305 million.

In 2009, three-quarters of all medical and health sciences R&D was for basic medicine or clinical medicine (together \$1.4 billion), with health sciences, medical biotechnology and other medical sciences accounting for the remainder (\$451 million). In 2013, basic and clinical medicine R&D accounted for just over one-half of all medical and health sciences R&D at \$699 million. Each of health sciences, medical biotechnology and other medical sciences increased between 2009 and 2013, together increasing from \$451 million to \$667 million over the five years.

Chart 6
Industrial R&D expenditures - Medical and health sciences, 2009 to 2013

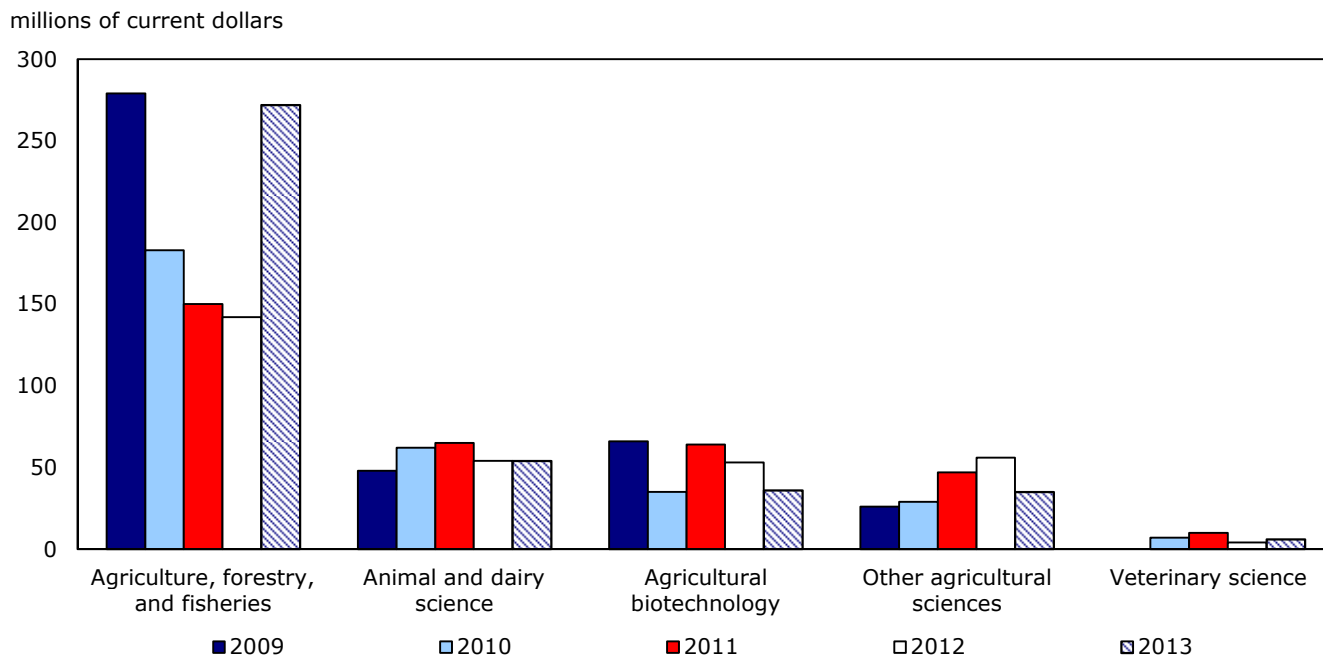
millions of current dollars



Source: CANSIM table 358-0140.

Agricultural sciences together accounted for \$402 million in 2013, with agriculture, forestry and fisheries the largest field of science at \$272 million. Both amounts were largely unchanged from 2009. The leading industry performing agricultural sciences R&D was scientific R&D services at \$134 million or 33% in 2013, followed by agriculture \$57 million and wholesale trade at \$52 million.

Chart 7
Industrial R&D expenditures - Agricultural sciences, 2009 to 2013



Note: The data for Veterinary science for 2009 is too unreliable to be published.

Source: CANSIM table 358-0140.

Canadian industrial R&D spending patterns are evolving

In 2015, industrial R&D spending is anticipated to reach \$15.5 billion, a decline from the most recent peak of \$16.9 billion in 2011. Industrial R&D rebounded from 2008/2009, but has since shown signs of decline, with R&D spending intentions for 2015 down by 7.1% from 2008 levels. Performing businesses continued to be the main source of funds for industrial R&D performance. The majority of Canadian industrial R&D spending is focused on engineering and technology, with a notable concentration on information and communication technology-related fields, in which Canada is well-known.

While employment in R&D occupations, in terms of full-time equivalents, has also declined since 2008/2009, there is evidence that R&D employment is undergoing professionalization with less of a need for supporting positions, which could be connected to the increasing importance of R&D in service industries and natural resources.

Industrial R&D spending patterns over the longer term have mirrored significant developments in the national economy. For example, intramural R&D spending has shifted from manufacturing industries to service industries and the mining, quarrying and oil and gas extraction industries, as these sectors have gained importance in the Canadian economy. It follows that energy-related intramural R&D spending also expanded between 2009 and 2013 with fossil fuel R&D at the forefront. While industrial intramural R&D spending remains concentrated in Ontario and Quebec, there has been a westward shift in R&D performance, due, in part, to the doubling of industrial R&D spending in the Albertan mining, quarrying and oil and gas extraction industries between 2009 and 2013.

Note to data users**Collection period for reference year 2013**

Data for industrial R&D 2015 intentions were collected from September 2, 2014 to February 6, 2015. Most of the data collection took place before the sudden decline in oil prices that occurred in late 2014. R&D spending intentions for 2015 may be revised in subsequent collection periods.

Upcoming changes to Statistics Canada's industrial R&D statistics program

Survey reference year 2014 will mark important changes to the industrial R&D statistics program. The survey will undergo conceptual, methodological, processing and output changes.

The Research and Development in Canadian Industry (RDCI) survey has been a census of all known R&D performing or funding businesses. Prior to 1997, the data were obtained from questionnaires with long forms sent to the largest R&D performers and short forms sent to businesses with smaller R&D programs or projects. Since reference year 1997, the RDCI survey methodology has combined research and development data from two sources: RDCI questionnaires and the Scientific Research and Experimental Development (SR&ED) Tax Incentive Program records of approved claims (the latter is administered by the Canada Revenue Agency (CRA)). The current reference year, 2013, is the last survey cycle of the RDCI that employs this methodology.

Budget 2012 made expenditures for purchased and leased machinery and equipment for R&D activities ineligible under the SR&ED program, beginning January 1, 2014, changing the nature of the data contained in the SR&ED tax records. As a result, a new survey methodology has been developed to ensure that all required R&D expenditures data, including capital expenditures for R&D, remain available.

Starting in reference year 2014, the RDCI will be a weighted sample survey, supplemented by administrative tax data from SR&ED tax records. The reference year will change from the business' fiscal year ending in the calendar year to its fiscal year ending within the fiscal period from April 1, 2014 to March 31, 2015, using reference year 2014 as an example. The sample of companies receiving a questionnaire will be expanded from 2,000 to 8,250. The SR&ED tax data will be used to maintain the survey frame, to represent the smallest R&D performers thereby reducing response burden and assisting in imputation for non-response.

In addition to the new survey methodology, the RDCI questionnaire has been modified to obtain data on R&D in the social sciences and humanities, previously excluded from measures of industrial R&D. New questions on the nature of R&D (basic research, applied research and experimental development), results of prior R&D spending, on-site R&D consultants and contractors, and details of R&D spending activities have been added.

Questions on the level of education of R&D personnel, postal code of R&D locations, detailed breakdowns of the components of planned current and capital R&D spending, during the two years following the reference period, will be discontinued to reduce response burden.

The dissemination of industrial R&D expenditures and personnel data, beginning in reference year 2014, will reflect the changes to survey methodology and questionnaire content. In addition, changes to the industry groups reporting research and development in Canada will enable more detailed information about R&D activities across the business enterprise sector.

Related products

Selected publications from Statistics Canada

88-001-X	Science Statistics
88-221-X	Gross Domestic Expenditures on Research and Development in Canada (GERD), and the Provinces
88-522-X	Science and Technology Activities and Impacts: A Framework for a Statistical Information
88F0006X	BSSTSD, Working Papers

Selected CANSIM tables from Statistics Canada

358-0001	Gross domestic expenditures on research and development, by science type and by funder and performer sector, annual
358-0024	Business enterprise research and development (BERD) characteristics, by industry group based on the North American Industry Classification System (NAICS), annual
358-0140	Business enterprise research and development (R&D) characteristics, by field of science or technology and North American Industry Classification System (NAICS)
358-0141	Business enterprise extramural payments for research and development, by location and sector of recipients
358-0161	Business enterprise research and development (BERD) characteristics, by industry group based on the North American Industry Classification System (NAICS), provinces and Territories, annual
358-0205	Business enterprise intramural research and development expenditures, by country of control and North American Industry Classification System (NAICS)
358-0206	Business enterprise extramural payments for research and development, by location of recipient and North American Industry Classification System (NAICS)
358-0207	Business enterprise intramural research and development expenditures, by sources of funds
358-0208	Business enterprise intramural research and development expenditures, by performing research and development company employment size
358-0209	Business enterprise intramural research and development expenditures, by performing research and development company revenue size
358-0210	Business enterprise intramural research and development expenditures, by research and development expenditure size

358-0211	Business enterprise current intramural research and development expenditures as a percentage of performing research and development company revenues, by country of control and North American Industry Classification System (NAICS)
358-0212	Business enterprise expenditures made and payments received for intellectual property and other technology assistance
358-0213	Business enterprise foreign receipts and payments for technological services
358-0214	Industrial energy research and development expenditures and extramural payments outside Canada, by area of technology

Selected surveys from Statistics Canada

4201	Research and Development in Canadian Industry
4205	Energy Research and Development Expenditures by Area of Technology

Selected summary tables from Statistics Canada

- *Domestic spending on research and development (GERD), funding sector, by province*
- *Domestic spending on research and development (GERD), performing sector, by province*
- *Domestic spending on research and development (GERD)*
- *Research and development performed by the business enterprise sector*

Statistical tables

Table 1
Business enterprise research and development expenditures in current and 2007 constant dollars

	Current dollars			Gross domestic product implicit price index (2007)	2007 constant dollars		
	Current intramural expenditures	Capital expenditures	Total intramural expenditures		Current intramural expenditures	Capital expenditures	Total intramural expenditures
	millions of dollars			index = 2007	millions of dollars		
2015 p	14,185 A	1,277 B	15,462 A	..	..	..	..
2014 p	14,508 A	1,369 A	15,877 A	113.0	12,839 A	1,212 A	14,050 A
2013 p	14,784 A	1,249 A	16,032 A	111.0	13,319 A	1,125 A	14,443 A
2012 r	15,224 A	1,475 A	16,700 A	109.5	13,903 A	1,347 A	15,251 A
2011 r	15,801 A	1,092 A	16,894 A	107.9	14,644 A	1,012 A	15,657 A
2010	14,871 A	932 A	15,803 A	104.4	14,244 A	893 A	15,137 A
2009	15,043 A	995 A	16,038 A	101.7	14,792 A	978 A	15,770 A
2008	15,569 A	1,075 A	16,644 A	103.9	14,985 A	1,035 A	16,019 A
2007	15,651	1,105	16,756	100.0	15,651	1,105	16,756
2006	15,318	1,155	16,474	96.9	15,808	1,192	17,001
2005	14,572	1,067	15,638	94.3	15,453	1,131	16,583
2004	14,095	1,049	15,144	91.4	15,421	1,148	16,569
2003	13,110	985	14,094	88.5	14,814	1,113	15,925
2002	12,492	1,052	13,545	85.6	14,593	1,229	15,824
2001	12,767	1,499	14,266	84.6	15,091	1,772	16,863
2000	11,201	1,194	12,395	83.2	13,463	1,435	14,898
1999	9,360	1,039	10,399	79.8	11,729	1,302	13,031
1998	8,727	955	9,682	78.4	11,131	1,218	12,349
1997	7,874	865	8,739	78.5	10,031	1,102	11,132
1996	7,159	838	7,997	77.6	9,226	1,080	10,305
1995	7,286	705	7,991	76.3	9,549	924	10,473
1994	6,938	629	7,567	74.6	9,300	843	10,143
1993	5,878	546	6,424	73.6	7,986	742	8,728
1992	5,286	457	5,742	72.6	7,281	629	7,909
1991	4,812	543	5,355	71.5	6,730	759	7,490

Note(s): Components may not add to totals due to rounding.

Source(s): CANSIM tables 358-0024 and 380-0102.

Table 2

International comparison of business enterprise expenditures on research and development as a percentage of gross domestic product, by selected OECD countries

	2013 ^p	2012 ^r	2011 ^r	2010 ^r	2000 ^r
	percent				
Israel	3.49	3.50	3.40	3.28	3.19
Korea	3.26	3.14	2.87	2.59	1.61
Japan	2.65	2.57	2.60	2.49	2.13
Finland	2.29	2.36	2.56	2.59	2.30
Sweden	2.28	2.22	2.22	2.21	..
Switzerland	..	2.05	..	..	1.72
Denmark	2.00	1.98	1.98	1.97	..
Germany	1.99	1.96	1.89	1.82	1.68
United States	..	1.96	1.90	1.86	1.94
Austria	1.93	1.93	1.84	1.88	..
Belgium	1.58	1.55	1.48	1.37	1.39
France	1.44	1.44	1.40	1.37	1.30
Australia	..	..	1.23	1.28	0.71
Netherlands	1.14	1.14	1.06	0.83	0.99
Ireland	..	1.14	1.09	1.11	0.78
Slovenia	1.98	1.95	1.79	1.40	0.76
United Kingdom	1.05	1.03	1.08	1.03	1.12
Czech Republic	1.03	0.96	0.86	0.77	0.67
Luxembourg	0.71	0.71	0.98	1.02	1.46
Canada	0.82	0.88	0.93	0.95	1.13
Norway	0.87	0.85	0.85	0.85	..
Spain	0.66	0.67	0.69	0.69	0.47
Italy	0.67	0.68	0.66	0.66	0.50
OECD total	1.64	1.61	1.57	1.53	1.48

Note(s): Countries are presented in descending order of business expenditures on research and development as a percentage of GDP based on their information for the most recent year reported on the table.

Source(s): OECD, Main Science and Technology Indicators. Volume 2014/2.

Table 3

Business enterprise research and development expenditures compared to gross domestic expenditures on research and development and gross domestic product

	Business expenditures on research and development	Gross domestic expenditures on research and development	Gross domestic product	Business expenditures on research and development / Gross domestic expenditures on research and development	Business expenditures on research and development / Gross domestic product
	millions of dollars			percent	
2015 ^p	15,462 ^A	..	..	..	..
2014 ^p	15,877 ^A	30,572	1,976,228	51.93	0.80
2013 ^p	16,032 ^A	30,748	1,893,759	52.14	0.85
2012 ^r	16,700 ^A	31,307	1,831,228	53.34	0.91
2011 ^r	16,894 ^A	31,486	1,770,014	53.66	0.95

Source(s): CANSIM tables 358-0001, 380-0064 and 358-0024.

Table 4
Concentration of business enterprise research and development intramural expenditures by top performers

	Top 25	Top 50	Top 75	Top 100	Total intramural expenditures
	percent				millions of dollars
2015 ^p	32	40	46	50	15,462 ^A
2014 ^p	34	42	47	52	15,877 ^A
2013 ^p	35	43	49	53	16,032 ^A
2012 ^r	34	42	47	51	16,700 ^A
2011 ^r	32	40	45	49	16,894 ^A
2010	30	39	44	48	15,803 ^A
2009	29	38	43	47	16,038 ^A
2008	28	38	44	48	16,644 ^A
2007	29	38	44	48	16,756
2006	31	42	48	51	16,474
2005	32	42	49	52	15,638
2004	33	43	49	53	15,144
2003	34	44	50	54	14,094
2002	34	44	50	54	13,545
2001	41	49	55	59	14,266
2000	46	54	60	64	12,395
1999	44	54	59	63	10,399
1998	46	55	60	64	9,682
1997	44	53	59	63	8,739
1996	41	50	56	61	7,997
1995	39	48	54	58	7,991
1994	39	49	54	58	7,567
1993	43	54	60	64	6,424
1992	45	55	60	64	5,742
1991	47	57	63	67	5,355

Table 5-1

Business enterprise research and development intramural expenditures — By industry

	2011 ^r	2012 ^r	2013 ^p	2014 ^p	2015 ^p
	millions of dollars				
Total all industries	16,894^A	16,700^A	16,032^A	15,877^A	15,462^A
Agriculture, forestry, fishing and hunting	145^A	97^A	81^A	85^B	83^B
Agriculture	120 ^A	86 ^A	70 ^A	75 ^B	73 ^B
Forestry, logging and support activities for forestry	16 ^A	5 ^A	5 ^A	5 ^D	5 ^E
Fishing, hunting, trapping and animal aquaculture	10 ^A	6 ^A	5 ^A	5 ^B	5 ^D
Mining, quarrying, and oil and gas extraction	1,387^A	1,608^B	1,585^C	1,442^B	1,362^C
Oil and gas extraction, contract drilling and related services	1,249 ^A	1,456 ^B	1,393 ^C	1,277 ^B	1,209 ^B
Mining and quarrying, contract drilling and related support activities	138 ^A	152 ^A	191 ^D	F	F
Utilities	199^A	213^A	232^A	212^A	218^A
Electric power generation, transmission and distribution	165 ^A	182 ^A	206 ^A	191 ^A	195 ^A
Other utilities	34 ^A	31 ^A	26 ^C	22 ^D	F
Construction	158^A	110^A	68^A	76^C	79^B
Manufacturing	7,372^A	7,165^A	6,753^A	6,785^A	6,430^A
Food manufacturing	156 ^A	142 ^A	129 ^A	142 ^A	139 ^A
Beverage and tobacco product manufacturing	13 ^A	x	x	x	x
Textile mills and textile product mills	42 ^A	31 ^A	26 ^A	29 ^B	29 ^B
Wood product manufacturing	88 ^A	88 ^A	77 ^A	75 ^C	101 ^A
Paper manufacturing	151 ^A	131 ^A	135 ^A	F	132 ^C
Printing and related support activities	46 ^B	43 ^A	42 ^A	47 ^D	47 ^D
Petroleum and coal products manufacturing	92 ^A	x	x	x	x
Pharmaceutical and medicine manufacturing	518 ^B	453 ^D	403 ^A	431 ^A	441 ^A
Other chemicals manufacturing	320 ^A	224 ^A	177 ^B	180 ^C	186 ^D
Plastic product manufacturing	154 ^A	146 ^A	115 ^A	123 ^B	125 ^A
Rubber product manufacturing	20 ^C	26 ^A	19 ^A	18 ^B	17 ^C
Non-metallic mineral product manufacturing	78 ^A	63 ^A	60 ^A	58 ^B	60 ^B
Primary metal (ferrous) manufacturing	47 ^A	44 ^A	30 ^A	34 ^E	35 ^B
Primary metal (non-ferrous) manufacturing	168 ^A	164 ^A	208 ^A	99 ^B	105 ^A
Fabricated metal product manufacturing	221 ^A	197 ^A	188 ^A	205 ^B	199 ^B
Machinery manufacturing	652 ^C	597 ^A	556 ^A	566 ^A	558 ^A
Computer and peripheral equipment manufacturing	53 ^A	58 ^A	60 ^B	62 ^B	63 ^A
Communications equipment manufacturing	1,479 ^A	1,489 ^D	1,314 ^A	1,323 ^A	939 ^A
Semiconductor and other electronic component manufacturing	521 ^A	485 ^A	455 ^A	443 ^A	429 ^A
Navigational, measuring, medical and control instrument manufacturing	376 ^A	440 ^A	360 ^A	386 ^A	377 ^A
Other computer and electronic products manufacturing	26 ^A	33 ^A	29 ^A	28 ^D	31 ^E
Electrical equipment, appliance and component manufacturing	147 ^A	146 ^A	162 ^A	157 ^B	166 ^A
Motor vehicle and parts manufacturing	256 ^A	247 ^A	F	244 ^A	253 ^B
Aerospace products and parts manufacturing	1,315 ^D	1,454 ^A	1,573 ^A	1,527 ^A	1,510 ^A
All other transportation equipment manufacturing	188 ^A	144 ^A	146 ^A	146 ^A	144 ^D
Furniture and related product manufacturing	38 ^A	30 ^A	22 ^A	23 ^B	22 ^C
Other manufacturing industries	209 ^A	212 ^A	160 ^A	179 ^B	172 ^C
Services	7,632^A	7,507^A	7,313^A	7,277^A	7,290^A
Wholesale trade	1,398 ^A	1,494 ^A	1,336 ^A	1,360 ^A	1,347 ^B
Retail trade	83 ^A	66 ^A	60 ^A	60 ^B	60 ^C
Transportation and warehousing	60 ^A	63 ^A	82 ^B	74 ^A	74 ^B
Information and cultural industries	1,137 ^B	1,240 ^A	1,249 ^A	1,233 ^A	1,264 ^A
Finance, insurance and real estate	250 ^A	253 ^A	265 ^A	223 ^A	225 ^C
Architectural, engineering and related services	480 ^A	502 ^A	441 ^A	393 ^B	378 ^B
Computer systems design and related services	1,556 ^A	1,344 ^A	1,377 ^A	1,405 ^A	1,396 ^A
Management, scientific and technical consulting services	95 ^A	84 ^A	81 ^A	F	87 ^B
Scientific research and development services	2,035 ^A	1,947 ^A	1,836 ^A	1,823 ^A	1,824 ^A
Health care and social assistance	98 ^A	90 ^A	87 ^A	96 ^B	95 ^C
All other services	439 ^A	424 ^A	498 ^A	518 ^A	541 ^B

Note(s): Components may not add to totals due to rounding.

Table 5-2

Business enterprise research and development intramural expenditures — By province

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Total	16,038 ^A	15,803 ^A	16,894 ^A	16,700 ^A	16,032 ^A
Atlantic Canada	337 ^A	268 ^A	279 ^A	273 ^A	222 ^A
Newfoundland and Labrador	87 ^B	66 ^A	75 ^A	98 ^C	81 ^B
Prince Edward Island	13 ^D	12 ^A	13 ^B	23 ^A	20 ^A
Nova Scotia	110 ^B	89 ^A	87 ^B	82 ^B	60 ^A
New Brunswick	127 ^B	101 ^A	104 ^B	71 ^A	60 ^A
Quebec	4,757 ^B	4,764 ^A	4,944 ^B	4,692 ^A	4,665 ^A
Ontario	7,384 ^A	7,193 ^A	7,711 ^A	7,526 ^A	6,999 ^A
Manitoba	209 ^C	224 ^A	210 ^B	231 ^A	232 ^A
Saskatchewan	155 ^B	162 ^A	211 ^A	216 ^A	283 ^A
Alberta	1,571 ^A	1,530 ^A	1,848 ^A	2,173 ^A	2,001 ^A
British Columbia and Territories ¹	1,626 ^A	1,664 ^A	1,691 ^A	1,590 ^A	1,630 ^A

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding.

Table 5-3

Business enterprise research and development intramural expenditures — By province and by type of expenditures, 2013^p

	Total business enterprise research and development current expenditures	Total business enterprise research and development capital expenditures	Total business enterprise research and development intramural expenditures
	millions of dollars		
Total	14,784 ^A	1,249 ^A	16,032 ^A
Atlantic Canada	205 ^B	16 ^A	222 ^A
Newfoundland and Labrador	x	x	81 ^B
Prince Edward Island	x	x	20 ^A
Nova Scotia	x	x	60 ^A
New Brunswick	58 ^A	3 ^A	60 ^A
Quebec	4,433 ^A	233 ^A	4,665 ^A
Ontario	6,714 ^A	285 ^A	6,999 ^A
Manitoba	189 ^A	43 ^A	232 ^A
Saskatchewan	235 ^A	48 ^A	283 ^A
Alberta	1,444 ^A	557 ^A	2,001 ^A
British Columbia and Territories ¹	1,563 ^A	66 ^A	1,630 ^A

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding.

Table 5-4

Business enterprise research and development intramural expenditures — By industry, by region, 2013¹

	Atlantic Canada	Quebec	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia and Territories ¹	Total
millions of dollars								
Total all industries	222^A	4,665^A	6,999^A	232^A	283^A	2,001^A	1,630^A	16,032^A
Agriculture, forestry, fishing and hunting	x	26^A	22^A	1^A	3^A	8^A	x	81^A
Agriculture	4 ^A	25 ^A	22 ^A	1 ^A	3 ^A	7 ^A	8 ^A	70 ^A
Forestry, logging and support activities for forestry	x	1 ^A	x	0 ^A	0 ^A	1 ^A	1 ^A	5 ^A
Fishing, hunting, trapping and animal aquaculture	1 ^A	0 ^A	x	0 ^A	0 ^A	0 ^A	x	5 ^A
Mining, quarrying, and oil and gas extraction	x	51^C	81^B	x	113^A	1,076^A	231^A	1,585^C
Oil and gas extraction, contract drilling and related services	x	0 ^A	F	x	x	1,070 ^A	x	1,393 ^C
Mining and quarrying, contract drilling and related support activities	x	51 ^A	79 ^A	x	x	6 ^A	x	191 ^D
Utilities	x	x	x	x	F	5^D	F	232^A
Electric power generation, transmission and distribution	x	x	x	x	0 ^A	2 ^A	1 ^A	206 ^A
Other utilities	F	x	x	1 ^D	F	F	F	26 ^C
Construction	x	x	x	0^D	2^C	12^A	x	68^A
Manufacturing	65^A	2,644^A	3,312^A	73^A	61^A	215^A	384^A	6,753^A
Food manufacturing	7 ^A	54 ^A	53 ^A	1 ^A	3 ^A	4 ^A	7 ^A	129 ^A
Beverage and tobacco product manufacturing	x	x	x	0 ^A	0 ^A	x	F	x
Textile mills and textile product mills	x	13 ^A	12 ^A	0 ^A	x	0 ^A	x	26 ^A
Wood product manufacturing	x	12 ^A	7 ^A	x	x	34 ^A	18 ^A	77 ^A
Paper manufacturing	4 ^A	82 ^A	32 ^A	1 ^A	0 ^A	2 ^A	13 ^A	135 ^A
Printing and related support activities	0 ^A	18 ^A	21 ^A	1 ^A	x	2 ^A	x	42 ^A
Petroleum and coal products manufacturing	x	x	14 ^A	x	0 ^A	x	0 ^A	x
Pharmaceutical and medicine manufacturing	6 ^A	128 ^A	250 ^A	x	x	x	14 ^A	403 ^A
Other chemicals manufacturing	F	35 ^B	91 ^A	4 ^D	17 ^A	22 ^B	6 ^E	177 ^B
Plastic product manufacturing	x	30 ^A	73 ^A	2 ^B	x	7 ^A	x	115 ^A
Rubber product manufacturing	x	6 ^A	7 ^A	x	x	x	x	19 ^A
Non-metallic mineral product manufacturing	x	25 ^A	20 ^A	x	F	3 ^A	10 ^A	60 ^A
Primary metal (ferrous) manufacturing	x	x	17 ^A	x	x	3 ^A	0 ^A	30 ^A
Primary metal (non-ferrous) manufacturing	0 ^A	x	x	x	x	x	x	208 ^A
Fabricated metal product manufacturing	3 ^A	58 ^A	102 ^A	2 ^A	3 ^A	11 ^A	8 ^A	188 ^A
Machinery manufacturing	6 ^A	198 ^A	264 ^A	17 ^A	20 ^A	29 ^A	23 ^A	556 ^A
Computer and peripheral equipment manufacturing	x	13 ^A	28 ^A	x	0 ^A	1 ^A	17 ^A	60 ^B
Communications equipment manufacturing	x	107 ^A	1,169 ^A	x	x	x	24 ^B	1,314 ^A
Semiconductor and other electronic component manufacturing	x	75 ^A	286 ^A	1 ^A	x	6 ^A	85 ^A	455 ^A
Navigational, measuring, medical and control instrument manufacturing	6 ^C	100 ^A	199 ^A	x	x	15 ^B	39 ^A	360 ^A
Other computer and electronic products manufacturing	0 ^A	14 ^A	8 ^A	0 ^A	0 ^A	x	x	29 ^A
Electrical equipment, appliance and component manufacturing	2 ^A	45 ^A	51 ^A	3 ^A	1 ^A	2 ^A	59 ^A	162 ^A
Motor vehicle and parts manufacturing	x	19 ^B	168 ^A	x	2 ^E	F	13 ^B	F
Aerospace products and parts manufacturing	x	1,233 ^A	320 ^A	x	0 ^A	3 ^D	F	1,573 ^A
All other transportation equipment manufacturing	x	108 ^A	34 ^A	x	0 ^A	x	3 ^A	146 ^A
Furniture and related product manufacturing	0 ^A	10 ^A	12 ^A	x	x	0 ^A	0 ^A	22 ^A
Other manufacturing industries	2 ^A	73 ^A	51 ^A	6 ^A	1 ^A	3 ^A	25 ^A	160 ^A
Services	109^A	1,797^A	3,472^A	154^A	103^A	687^A	993^A	7,313^A
Wholesale trade	19 ^A	256 ^A	841 ^A	24 ^A	11 ^A	110 ^A	74 ^A	1,336 ^A
Retail trade	F	17 ^D	28 ^C	F	F	F	F	60 ^A
Transportation and warehousing	3 ^B	10 ^A	13 ^A	x	x	36 ^A	19 ^A	82 ^B
Information and cultural industries	14 ^A	262 ^A	641 ^A	80 ^A	6 ^A	86 ^A	159 ^A	1,249 ^A
Finance, insurance and real estate	2 ^A	21 ^A	148 ^A	3 ^A	1 ^B	46 ^A	44 ^A	265 ^A
Architectural, engineering and related services	7 ^B	89 ^A	198 ^A	1 ^A	11 ^A	83 ^A	52 ^A	441 ^A
Computer systems design and related services	23 ^A	421 ^A	614 ^A	21 ^A	7 ^A	47 ^A	244 ^A	1,377 ^A
Management, scientific and technical consulting services	1 ^A	18 ^A	28 ^A	x	x	18 ^A	14 ^A	81 ^A
Scientific research and development services	27 ^A	593 ^A	751 ^A	11 ^B	27 ^A	108 ^A	320 ^A	1,836 ^A
Health care and social assistance	2 ^A	32 ^A	36 ^A	x	x	2 ^A	12 ^A	87 ^A
All other services	8 ^B	78 ^A	174 ^A	8 ^B	39 ^A	146 ^A	45 ^A	498 ^A

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding.

Table 5-5

Business enterprise research and development intramural expenditures — By major industrial sectors, Atlantic Canada

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Atlantic Canada	337 ^A	268 ^A	279 ^A	273 ^A	222 ^A
Agriculture, forestry, fishing and hunting	12 ^A	9 ^A	9 ^A	10 ^A	x
Mining, quarrying, and oil and gas extraction	40 ^A	x	x	42 ^D	x
Utilities	10 ^B	x	x	11 ^A	x
Construction	3 ^A	x	x	3 ^A	x
Manufacturing	149 ^A	115 ^A	89 ^A	72 ^C	65 ^A
Services	122 ^B	116 ^A	153 ^A	136 ^A	109 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-6

Business enterprise research and development intramural expenditures — By major industrial sectors, Quebec

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Quebec	4,757 ^B	4,764 ^A	4,944 ^B	4,692 ^A	4,665 ^A
Agriculture, forestry, fishing and hunting	40 ^A	x	48 ^A	33 ^A	26 ^A
Mining, quarrying, and oil and gas extraction	x	x	x	22 ^B	51 ^C
Utilities	x	x	x	107 ^A	x
Construction	43 ^A	x	33 ^A	23 ^A	x
Manufacturing	2,357 ^D	2,456 ^A	2,521 ^D	2,549 ^A	2,644 ^A
Services	2,195 ^A	2,125 ^A	2,200 ^A	1,957 ^A	1,797 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-7

Business enterprise research and development intramural expenditures — By major industrial sectors, Ontario

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Ontario	7,384 ^A	7,193 ^A	7,711 ^A	7,526 ^A	6,999 ^A
Agriculture, forestry, fishing and hunting	46 ^A	52 ^A	42 ^A	23 ^A	22 ^A
Mining, quarrying, and oil and gas extraction	61 ^A	51 ^A	82 ^A	82 ^C	81 ^B
Utilities	46 ^A	62 ^A	72 ^A	81 ^A	x
Construction	57 ^A	50 ^B	83 ^A	53 ^A	x
Manufacturing	4,227 ^B	3,663 ^A	3,847 ^B	3,702 ^A	3,312 ^A
Services	2,947 ^A	3,314 ^A	3,585 ^A	3,584 ^A	3,472 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-8

Business enterprise research and development intramural expenditures — By major industrial sectors, Manitoba

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Manitoba	209 ^C	224 ^A	210 ^B	231 ^A	232 ^A
Agriculture, forestry, fishing and hunting	4 ^A	8 ^A	6 ^A	4 ^A	1 ^A
Mining, quarrying, and oil and gas extraction	2 ^A	x	x	4 ^A	x
Utilities	1 ^D	x	x	1 ^A	x
Construction	1 ^A	1 ^A	x	2 ^A	0 ^D
Manufacturing	80 ^D	84 ^A	92 ^D	107 ^B	73 ^A
Services	121 ^B	128 ^A	110 ^A	113 ^A	154 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-9

Business enterprise research and development intramural expenditures — By major industrial sectors, Saskatchewan

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Saskatchewan	155 ^B	162 ^A	211 ^A	216 ^A	283 ^A
Agriculture, forestry, fishing and hunting	5 ^A	x	x	4 ^A	3 ^A
Mining, quarrying, and oil and gas extraction	x	20 ^A	x	30 ^B	113 ^A
Utilities	x	x	x	1 ^A	F
Construction	x	x	x	2 ^A	2 ^C
Manufacturing	69 ^B	68 ^A	91 ^B	73 ^B	61 ^A
Services	62 ^D	63 ^A	89 ^B	106 ^A	103 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-10

Business enterprise research and development intramural expenditures — By major industrial sectors, Alberta

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Alberta	1,571 ^A	1,530 ^A	1,848 ^A	2,173 ^A	2,001 ^A
Agriculture, forestry, fishing and hunting	3 ^B	4 ^B	x	4 ^A	8 ^A
Mining, quarrying, and oil and gas extraction	480 ^A	496 ^A	974 ^A	1,355 ^A	1,076 ^A
Utilities	14 ^D	x	x	7 ^A	5 ^D
Construction	19 ^A	x	17 ^A	18 ^A	12 ^A
Manufacturing	488 ^A	576 ^A	324 ^A	228 ^A	215 ^A
Services	567 ^B	436 ^A	525 ^B	561 ^A	687 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-11

Business enterprise research and development intramural expenditures — By major industrial sectors, British Columbia

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
British Columbia and Territories ¹	1,626 ^A	1,664 ^A	1,691 ^A	1,590 ^A	1,630 ^A
Agriculture, forestry, fishing and hunting	16 ^A	16 ^A	34 ^A	18 ^A	x
Mining, quarrying, and oil and gas extraction	309 ^A	377 ^A	x	72 ^A	231 ^A
Utilities	x	x	x	6 ^A	F
Construction	x	x	x	10 ^A	x
Manufacturing	395 ^B	374 ^A	409 ^B	435 ^A	384 ^A
Services	882 ^A	875 ^A	969 ^A	1,050 ^A	993 ^A

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding.

Table 5-12

Business enterprise research and development intramural expenditures — By country of control

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Total country of control	16,038 ^A	15,803 ^A	16,894 ^A	16,700 ^A	16,032 ^A
Canada	10,720 ^A	10,256 ^A	11,194 ^A	10,552 ^A	10,132 ^A
Foreign	5,318 ^A	5,548 ^B	5,700 ^A	6,147 ^A	5,900 ^A
United States	3,017 ^A	3,114 ^A	3,311 ^A	3,758 ^A	3,645 ^A
Other foreign	2,301 ^A	2,434 ^C	2,388 ^A	2,389 ^A	2,255 ^B

Note(s): Components may not add to totals due to rounding.

Table 5-13

Business enterprise research and development intramural expenditures — Of Canadian-controlled companies compared to all intramural research and development expenditures, by industry

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	percent				
Total all industries	67	65	66	63	63
Agriculture, forestry, fishing and hunting	x	70	78	x	73
Agriculture	x	x	74	x	69
Forestry, logging and support activities for forestry	100	100	100	100	100
Fishing, hunting, trapping and animal aquaculture	x	x	100	x	100
Mining, quarrying, and oil and gas extraction	41	53	71	64	61
Oil and gas extraction, contract drilling and related services	43	55	76	66	64
Mining and quarrying, contract drilling and related support activities	28	37	25	45	37
Utilities	99	99	97	98	99
Electric power generation, transmission and distribution	x	x	x	99	x
Other utilities	x	x	x	91	x
Construction	x	93	91	x	94
Manufacturing	66	63	64	65	65
Food manufacturing	83	82	83	78	79
Beverage and tobacco product manufacturing	61	66	66	71	61
Textile mills and textile product mills	77	81	84	x	x
Wood product manufacturing	79	82	79	x	x
Paper manufacturing	40	44	52	62	66
Printing and related support activities	x	97	x	95	x
Petroleum and coal products manufacturing	x	x	88	x	x
Pharmaceutical and medicine manufacturing	41	41	41	55	49
Other chemicals manufacturing	58	34	38	51	49
Plastic product manufacturing	82	85	82	73	71
Rubber product manufacturing	42	46	52	x	x
Non-metallic mineral product manufacturing	57	56	43	x	x
Primary metal (ferrous) manufacturing	17	23	26	x	x
Primary metal (non-ferrous) manufacturing	78	22	22	12	x
Fabricated metal product manufacturing	91	91	90	89	88
Machinery manufacturing	80	89	83	85	83
Computer and peripheral equipment manufacturing	52	53	55	x	x
Communications equipment manufacturing	86	88	85	88	90
Semiconductor and other electronic component manufacturing	x	x	x	26	28
Navigational, measuring, medical and control instrument manufacturing	39	39	44	35	42
Other computer and electronic products manufacturing	x	x	x	x	x
Electrical equipment, appliance and component manufacturing	46	52	57	64	52
Motor vehicle and parts manufacturing	50	64	62	51	62
Aerospace products and parts manufacturing	x	x	x	x	x
All other transportation equipment manufacturing	x	x	90	67	82
Furniture and related product manufacturing	98	97	x	x	x
Other manufacturing industries	83	76	86	76	75
Services	69	67	66	60	61
Wholesale trade	36	44	45	26	24
Retail trade	x	x	x	x	x
Transportation and warehousing	98	x	100	100	x
Information and cultural industries	78	83	80	73	81
Finance, insurance and real estate	51	89	88	86	90
Architectural, engineering and related services	85	84	83	82	87
Computer systems design and related services	86	77	78	75	72
Management, scientific and technical consulting services	99	99	x	x	98
Scientific research and development services	66	53	49	48	48
Health care and social assistance	x	x	x	x	x
All other services	91	79	83	84	64

Table 5-14

Business enterprise research and development intramural expenditures — By expenditures size ¹

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Total research and development expenditure size	16,038 ^A	15,803 ^A	16,894 ^A	16,700 ^A	16,032 ^A
Less than \$50,000	244 ^E	234 ^A	222 ^A	211 ^A	F
\$50,000 to \$99,999	434 ^C	417 ^A	399 ^A	368 ^A	300 ^C
\$100,000 to \$199,999	720 ^A	696 ^B	672 ^A	614 ^A	529 ^A
\$200,000 to \$399,999	946 ^A	902 ^C	909 ^A	813 ^A	720 ^A
\$400,000 to \$999,999	1,364 ^A	1,303 ^A	1,373 ^A	1,382 ^A	1,135 ^B
Greater than \$999,999	12,329 ^A	12,251 ^A	13,320 ^A	13,311 ^A	13,191 ^A

1. Research and development expenditures size is based on current intramural expenditures.

Note(s): Components may not add to totals due to rounding.

Table 5-15

Business enterprise research and development intramural expenditures — By sources of funds

	Canadian business enterprises			Federal sources		Provincial	Other Canadian sources	Foreign	Total sources of funds
	Research and development performing companies	Related companies	Research and development contracts for other companies	Federal grants	Federal contracts				
	millions of dollars								
2013 ^p	12,814 ^A	610 ^A	172 ^A	304 ^A	54 ^A	317 ^A	21 ^A	1,741 ^A	16,032 ^A
2012 ^r	13,770 ^A	428 ^A	120 ^C	237 ^A	106 ^B	297 ^A	22 ^B	1,718 ^A	16,700 ^A
2011 ^r	13,887 ^A	437 ^A	174 ^C	384 ^A	68 ^A	155 ^C	32 ^A	1,758 ^C	16,894 ^A
2010	12,424 ^A	800 ^A	119 ^A	326 ^A	101 ^A	163 ^A	18 ^B	1,853 ^A	15,803 ^A
2009	12,987 ^A	431 ^A	149 ^A	266 ^A	38 ^A	148 ^A	15 ^B	2,003 ^A	16,038 ^A
2008	13,175	789	165	284	35	71	44	2,082	16,644
2007	13,013	520	145	216	37	97	65	2,663	16,756
2006	13,283	463	173	221	38	155	28	2,113	16,474
2005	12,342	401	131	289	34	90	25	2,327	15,638
2004	12,018	350	149	228	43	59	18	2,280	15,144
2003	11,102	379	153	256	44	70	17	2,073	14,094
2002	10,757	426	170	231	69	53	17	1,822	13,545

Note(s): Components may not add to totals due to rounding.

Table 5-16

Business enterprise research and development intramural expenditures — By sources of funds and by industry, 2013^p

	Canadian performing companies	Government and other Canadian sources	Foreign sources	Total sources of funds
millions of dollars				
Total all industries	12,814^A	1,477^A	1,741^A	16,032^A
Agriculture, forestry, fishing and hunting	72^A	x	x	81^A
Agriculture	x	x	x	70 ^A
Forestry, logging and support activities for forestry	x	x	0 ^A	5 ^A
Fishing, hunting, trapping and animal aquaculture	x	x	0 ^A	5 ^A
Mining, quarrying, and oil and gas extraction	x	x	x	1,585^C
Oil and gas extraction, contract drilling and related services	x	x	0 ^A	1,393 ^C
Mining and quarrying, contract drilling and related support activities	x	4 ^A	x	191 ^D
Utilities	x	x	x	232^A
Electric power generation, transmission and distribution	x	x	x	206 ^A
Other utilities	x	x	0 ^A	26 ^C
Construction	65^A	3^C	0^A	68^A
Manufacturing	5,751^A	427^A	576^A	6,753^A
Food manufacturing	124 ^A	x	x	129 ^A
Beverage and tobacco product manufacturing	x	0 ^A	0 ^A	x
Textile mills and textile product mills	x	x	0 ^A	26 ^A
Wood product manufacturing	x	x	0 ^A	77 ^A
Paper manufacturing	x	x	0 ^A	135 ^A
Printing and related support activities	x	x	x	42 ^A
Petroleum and coal products manufacturing	x	2 ^A	0 ^A	x
Pharmaceutical and medicine manufacturing	x	x	131 ^A	403 ^A
Other chemicals manufacturing	166 ^A	3 ^E	8 ^B	177 ^B
Plastic product manufacturing	113 ^A	2 ^C	0 ^A	115 ^A
Rubber product manufacturing	x	x	0 ^A	19 ^A
Non-metallic mineral product manufacturing	57 ^A	x	x	60 ^A
Primary metal (ferrous) manufacturing	25 ^A	x	x	30 ^A
Primary metal (non-ferrous) manufacturing	208 ^A	0 ^A	0 ^A	208 ^A
Fabricated metal product manufacturing	x	x	x	188 ^A
Machinery manufacturing	x	28 ^A	x	556 ^A
Computer and peripheral equipment manufacturing	57 ^A	x	x	60 ^B
Communications equipment manufacturing	x	5 ^B	x	1,314 ^A
Semiconductor and other electronic component manufacturing	x	15 ^A	x	455 ^A
Navigation, measuring, medical and control instrument manufacturing	329 ^A	x	x	360 ^A
Other computer and electronic products manufacturing	x	x	0 ^A	29 ^A
Electrical equipment, appliance and component manufacturing	x	14 ^A	x	162 ^A
Motor vehicle and parts manufacturing	199 ^A	x	x	F
Aerospace products and parts manufacturing	x	x	x	1,573 ^A
All other transportation equipment manufacturing	x	x	x	146 ^A
Furniture and related product manufacturing	22 ^A	0 ^D	0 ^A	22 ^A
Other manufacturing industries	149 ^A	x	x	160 ^A
Services	x	x	1,146^A	7,313^A
Wholesale trade	960 ^A	90 ^A	287 ^A	1,336 ^A
Retail trade	x	F	x	60 ^A
Transportation and warehousing	x	x	x	82 ^B
Information and cultural industries	1,172 ^A	40 ^A	38 ^A	1,249 ^A
Finance, insurance and real estate	259 ^A	x	x	265 ^A
Architectural, engineering and related services	376 ^A	51 ^A	13 ^B	441 ^A
Computer systems design and related services	1,048 ^A	121 ^A	208 ^A	1,377 ^A
Management, scientific and technical consulting services	70 ^A	x	x	81 ^A
Scientific research and development services	902 ^A	347 ^A	587 ^A	1,836 ^A
Health care and social assistance	x	x	2 ^B	87 ^A
All other services	444 ^A	50 ^A	4 ^B	498 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-17

Business enterprise research and development intramural expenditures — By sources of funds and by country of control of performer, 2013^p

	Canadian performing companies	Federal government	Provincial government	Other Canadian sources	Foreign sources	Total sources of funds
millions of dollars						
Total country of control	12,814^A	357^A	317^A	803^A	1,741^A	16,032^A
Canada	8,922 ^A	328 ^A	123 ^A	559 ^A	200 ^A	10,132 ^A
United States	2,401 ^A	19 ^A	169 ^A	146 ^A	910 ^A	3,645 ^A
Other foreign	1,491 ^A	11 ^E	25 ^A	98 ^B	630 ^A	2,255 ^B

Note(s): Components may not add to totals due to rounding.

Table 5-18

Business enterprise research and development intramural expenditures — By performing company revenue size

	2009	2010	2011 ^r	2012 ^r	2013 ^p
millions of dollars					
Total revenue size	16,038^A	15,803^A	16,894^A	16,700^A	16,032^A
Industrial Non-profit organizations	200	268 ^A	309 ^A	371 ^A	394 ^A
Less than \$1,000,000	1,387 ^B	1,187 ^B	1,173 ^B	1,013 ^D	959 ^C
\$1,000,000 to \$9,999,999	2,917 ^A	2,628 ^A	2,682 ^A	2,533 ^A	2,108 ^A
\$10,000,000 to \$49,999,999	2,223 ^A	2,274 ^A	2,467 ^A	2,387 ^C	2,190 ^B
\$50,000,000 to \$99,999,999	948 ^A	836 ^B	917 ^A	998 ^A	908 ^A
\$100,000,000 to \$399,999,999	1,746 ^A	1,633 ^D	2,099 ^A	2,227 ^A	2,001 ^B
Greater than \$399,999,999	6,617 ^A	6,978 ^A	7,247 ^A	7,171 ^A	7,472 ^A

Table 5-19

Business enterprise research and development intramural expenditures — By performing company employment size

	2009	2010	2011 ^r	2012 ^r	2013 ^p
millions of dollars					
Total employment size	16,038^A	15,803^A	16,894^A	16,700^A	16,032^A
Industrial non-profit organizations	200 ^A	268 ^A	309 ^A	371 ^A	394 ^A
1 to 49 employees	3,701 ^A	3,450 ^A	3,384 ^A	3,162 ^A	2,838 ^A
50 to 99 employees	1,418 ^B	1,299 ^B	1,347 ^A	1,212 ^B	1,040 ^A
100 to 199 employees	1,278 ^A	1,128 ^A	1,281 ^A	1,192 ^D	1,074 ^A
200 to 499 employees	1,661 ^A	1,513 ^B	1,750 ^A	1,923 ^A	1,667 ^A
500 to 999 employees	1,557 ^A	1,680 ^A	1,341 ^A	1,377 ^B	1,612 ^B
1,000 to 1,999 employees	1,575 ^A	1,808 ^D	1,654 ^A	1,450 ^A	1,435 ^A
Greater than 1,999 employees	4,647 ^A	4,658 ^A	5,829 ^A	6,012 ^A	5,972 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-20

Business enterprise research and development intramural expenditures — By field of science or technology

	2012 ^r	2013 ^p
	millions of dollars	
Total	16,700 ^A	16,032 ^A
Natural and formal sciences	1,559 ^A	1,368 ^A
Mathematics	39 ^B	36 ^A
Computer and information sciences	675 ^A	581 ^A
Physical sciences	92 ^B	122 ^A
Chemical sciences	278 ^A	259 ^A
Earth and related environmental sciences	274 ^B	182 ^A
Biological sciences	190 ^A	158 ^A
Other natural sciences	10 ^A	30 ^A
Engineering and technology	13,280 ^A	12,897 ^A
Civil engineering	126 ^A	99 ^A
Software engineering	2,859 ^A	2,624 ^A
Electrical engineering, electronic engineering and information technology	3,705 ^A	3,453 ^A
Mechanical engineering	2,355 ^A	1,960 ^A
Chemical engineering	506 ^A	548 ^A
Materials engineering	717 ^A	640 ^A
Medical engineering	61 ^A	63 ^A
Environmental engineering	755 ^A	744 ^A
Environmental biotechnology	16 ^E	17 ^A
Industrial biotechnology	64 ^B	38 ^A
Nano-technology	14 ^A	18 ^A
Other engineering and technologies	2,100 ^A	2,694 ^A
Medical and health sciences	1,552 ^A	1,364 ^A
Basic medicine	425 ^A	454 ^A
Clinical medicine	343 ^A	245 ^A
Health sciences	117 ^A	111 ^A
Medical biotechnology	312 ^A	295 ^A
Other medical sciences	355 ^A	261 ^A
Agricultural sciences	309 ^A	402 ^A
Agriculture, forestry, and fisheries	142 ^A	272 ^A
Animal and dairy science	54 ^A	54 ^A
Veterinary science	4 ^C	6 ^A
Agricultural biotechnology	53 ^A	36 ^A
Other agricultural sciences	56 ^A	35 ^A

Note(s): Components may not add to totals due to rounding.

Table 5-21

Business enterprise research and development intramural expenditures — By major fields of science or technology and industry, 2013^p

	Natural and formal sciences	Engineering and technology	Medical and health sciences	Agricultural sciences	Total all industries
millions of dollars					
Total all industries	1,368^A	12,897^A	1,364^A	402^A	16,032^A
Agriculture, forestry, fishing and hunting	x	x	x	63^A	81^A
Agriculture	6 ^A	x	x	57 ^A	70 ^A
Forestry, logging and support activities for forestry	x	x	x	x	5 ^A
Fishing, hunting, trapping and animal aquaculture	0 ^A	1 ^A	x	x	5 ^A
Mining, quarrying, and oil and gas extraction	x	1,434^A	0^A	x	1,588^C
Oil and gas extraction, contract drilling and related services	x	1,255 ^A	0 ^A	x	1,393 ^C
Mining and quarrying, contract drilling and related support activities	x	178 ^A	0 ^A	x	191 ^D
Utilities	x	x	x	x	232^A
Electric power generation, transmission and distribution	x	x	0 ^A	0 ^A	206 ^A
Other utilities	x	x	x	x	26 ^C
Construction	4^B	64^A	0^A	0^D	68^A
Manufacturing	327^A	5,969^A	359^A	98^A	6,753^A
Food manufacturing	x	77 ^A	x	44 ^A	129 ^A
Beverage and tobacco product manufacturing	x	x	x	x	x
Textile mills and textile product mills	x	x	x	x	26 ^A
Wood product manufacturing	x	73 ^A	x	3 ^A	77 ^A
Paper manufacturing	x	132 ^A	x	x	135 ^A
Printing and related support activities	3 ^A	39 ^A	0 ^A	0 ^A	42 ^A
Petroleum and coal products manufacturing	x	x	0 ^A	x	x
Pharmaceutical and medicine manufacturing	90 ^A	x	305 ^A	x	403 ^A
Other chemicals manufacturing	41 ^A	89 ^A	7 ^A	41 ^A	177 ^B
Plastic product manufacturing	x	107 ^A	x	0 ^A	115 ^A
Rubber product manufacturing	x	x	0 ^A	0 ^A	19 ^A
Non-metallic mineral product manufacturing	x	x	0 ^A	x	60 ^A
Primary metal (ferrous) manufacturing	x	x	x	0 ^A	30 ^A
Primary metal (non-ferrous) manufacturing	x	x	0 ^A	0 ^A	208 ^A
Fabricated metal product manufacturing	4 ^A	183 ^A	x	x	188 ^A
Machinery manufacturing	x	534 ^A	x	x	556 ^A
Computer and peripheral equipment manufacturing	x	x	x	0 ^A	60 ^B
Communications equipment manufacturing	10 ^A	1,305 ^A	0 ^A	0 ^A	1,314 ^A
Semiconductor and other electronic component manufacturing	11 ^A	443 ^A	x	x	455 ^A
Navigational, measuring, medical and control instrument manufacturing	37 ^A	304 ^A	x	x	360 ^A
Other computer and electronic products manufacturing	3 ^A	x	x	0 ^A	29 ^A
Electrical equipment, appliance and component manufacturing	x	155 ^A	x	0 ^A	162 ^A
Motor vehicle and parts manufacturing	x	x	x	0 ^A	F
Aerospace products and parts manufacturing	x	1,572 ^A	x	0 ^A	1,573 ^A
All other transportation equipment manufacturing	x	x	0 ^A	0 ^A	146 ^A
Furniture and related product manufacturing	1 ^A	x	0 ^A	x	22 ^A
Other manufacturing industries	7 ^D	129 ^A	x	x	160 ^A
Services	846^A	5,223^A	1,005^A	240^A	7,313^A
Wholesale trade	66 ^A	856 ^A	362 ^A	52 ^A	1,336 ^A
Retail trade	9 ^A	48 ^A	x	x	60 ^A
Transportation and warehousing	10 ^A	71 ^A	0 ^A	1 ^C	82 ^B
Information and cultural industries	x	1,122 ^A	x	x	1,249 ^A
Finance, insurance and real estate	50 ^A	214 ^A	x	x	265 ^A
Architectural, engineering and related services	69 ^A	359 ^A	x	x	441 ^A
Computer systems design and related services	306 ^A	1,048 ^A	23 ^A	1 ^B	1,377 ^A
Management, scientific and technical consulting services	25 ^A	50 ^A	4 ^A	1 ^B	81 ^A
Scientific research and development services	153 ^A	1,051 ^A	498 ^A	134 ^A	1,836 ^A
Health care and social assistance	x	8 ^A	76 ^A	x	87 ^A
All other services	36 ^A	397 ^A	20 ^B	45 ^A	498 ^A

Note(s): Components may not add to totals due to rounding.

Table 6-1

Business enterprise research and development current intramural expenditures — By industry

	2011 ^r	2012 ^r	2013 ^p	2014 ^p	2015 ^p
	millions of dollars				
Total all industries	15,801^A	15,224^A	14,784^A	14,508^A	14,185^A
Agriculture, forestry, fishing and hunting	109^A	90^A	79^A	82^B	80^B
Agriculture	85 ^A	79 ^A	69 ^A	72 ^B	71 ^B
Forestry, logging and support activities for forestry	x	5 ^A	x	5 ^D	x
Fishing, hunting, trapping and animal aquaculture	x	6 ^A	x	5 ^B	x
Mining, quarrying, and oil and gas extraction	1,175^A	1,012^A	1,083^A	952^B	916^B
Oil and gas extraction, contract drilling and related services	1,038 ^A	863 ^A	897 ^A	798 ^A	773 ^A
Mining and quarrying, contract drilling and related support activities	137 ^A	149 ^A	186 ^A	155 ^D	143 ^E
Utilities	x	199^A	206^A	190^A	x
Electric power generation, transmission and distribution	x	x	x	x	x
Other utilities	33 ^A	x	x	x	21 ^C
Construction	x	93^A	65^A	74^C	x
Manufacturing	6,967^A	6,703^A	6,406^A	6,253^A	5,966^A
Food manufacturing	152 ^A	135 ^A	124 ^A	136 ^A	134 ^A
Beverage and tobacco product manufacturing	13 ^A	x	x	x	x
Textile mills and textile product mills	x	30 ^A	26 ^A	29 ^B	28 ^B
Wood product manufacturing	87 ^A	x	x	x	x
Paper manufacturing	148 ^A	129 ^A	134 ^A	x	131 ^C
Printing and related support activities	45 ^A	42 ^A	42 ^A	44 ^A	45 ^B
Petroleum and coal products manufacturing	x	x	60 ^A	x	x
Pharmaceutical and medicine manufacturing	496 ^A	428 ^A	391 ^A	418 ^A	426 ^A
Other chemicals manufacturing	300 ^A	199 ^A	169 ^A	173 ^C	179 ^C
Plastic product manufacturing	142 ^A	126 ^A	109 ^A	112 ^A	117 ^A
Rubber product manufacturing	19 ^A	21 ^A	19 ^A	18 ^B	16 ^C
Non-metallic mineral product manufacturing	75 ^A	63 ^A	58 ^A	57 ^B	59 ^A
Primary metal (ferrous) manufacturing	46 ^A	43 ^A	x	34 ^E	34 ^B
Primary metal (non-ferrous) manufacturing	167 ^A	x	x	99 ^B	x
Fabricated metal product manufacturing	205 ^A	180 ^A	169 ^A	184 ^B	180 ^B
Machinery manufacturing	624 ^A	576 ^A	541 ^A	514 ^B	508 ^B
Computer and peripheral equipment manufacturing	49 ^A	54 ^A	58 ^A	59 ^B	61 ^A
Communications equipment manufacturing	1,332 ^A	1,401 ^A	1,258 ^A	x	785 ^A
Semiconductor and other electronic component manufacturing	502 ^A	469 ^A	436 ^A	427 ^A	412 ^A
Navigational, measuring, medical and control instrument manufacturing	360 ^A	393 ^A	345 ^A	368 ^A	362 ^A
Other computer and electronic products manufacturing	25 ^A	30 ^A	29 ^A	28 ^D	30 ^E
Electrical equipment, appliance and component manufacturing	138 ^A	136 ^A	143 ^A	152 ^B	159 ^A
Motor vehicle and parts manufacturing	249 ^A	217 ^A	199 ^A	233 ^A	239 ^B
Aerospace products and parts manufacturing	x	x	x	x	x
All other transportation equipment manufacturing	184 ^A	141 ^A	142 ^A	142 ^A	141 ^D
Furniture and related product manufacturing	36 ^A	29 ^A	22 ^A	22 ^B	21 ^C
Other manufacturing industries	192 ^A	201 ^A	153 ^A	170 ^B	162 ^C
Services	7,236^A	7,127^A	6,945^A	6,957^A	6,950^A
Wholesale trade	1,344 ^A	1,429 ^A	1,299 ^A	1,322 ^A	1,316 ^B
Retail trade	73 ^A	63 ^A	x	x	59 ^C
Transportation and warehousing	57 ^A	62 ^A	x	70 ^B	70 ^B
Information and cultural industries	1,067 ^A	1,175 ^A	1,123 ^A	1,125 ^A	1,154 ^A
Finance, insurance and real estate	233 ^A	231 ^A	244 ^A	x	205 ^C
Architectural, engineering and related services	465 ^A	476 ^A	413 ^A	379 ^A	364 ^A
Computer systems design and related services	1,476 ^A	1,299 ^A	1,346 ^A	1,372 ^A	1,362 ^A
Management, scientific and technical consulting services	88 ^A	81 ^A	77 ^A	F	82 ^B
Scientific research and development services	1,946 ^A	1,827 ^A	1,758 ^A	1,749 ^A	1,748 ^A
Health care and social assistance	89 ^A	83 ^A	85 ^A	94 ^B	90 ^C
All other services	398 ^A	400 ^A	472 ^A	492 ^A	498 ^A

Note(s): Components may not add to totals due to rounding.

Table 6-2

Business enterprise research and development current intramural expenditures — By industry and by type of expenditures, 2013^p

	Wages and salaries	Other current expenditures	Total business enterprise research and development current expenditures
millions of dollars			
Total all industries	9,710^A	5,074^A	14,784^A
Agriculture, forestry, fishing and hunting	47^A	33^A	79^A
Agriculture	40 ^A	29 ^A	69 ^A
Forestry, logging and support activities for forestry	4 ^A	x	x
Fishing, hunting, trapping and animal aquaculture	3 ^A	x	x
Mining, quarrying, and oil and gas extraction	191^B	892^A	1,083^A
Oil and gas extraction, contract drilling and related services	136 ^B	762 ^A	897 ^A
Mining and quarrying, contract drilling and related support activities	56 ^A	130 ^A	186 ^A
Utilities	135^A	70^A	206^A
Electric power generation, transmission and distribution	118 ^A	x	x
Other utilities	17 ^A	x	x
Construction	55^A	10^A	65^A
Manufacturing	4,002^A	2,404^A	6,406^A
Food manufacturing	89 ^A	35 ^A	124 ^A
Beverage and tobacco product manufacturing	x	2 ^E	x
Textile mills and textile product mills	18 ^A	8 ^A	26 ^A
Wood product manufacturing	x	29 ^A	x
Paper manufacturing	40 ^A	94 ^A	134 ^A
Printing and related support activities	35 ^A	6 ^A	42 ^A
Petroleum and coal products manufacturing	x	x	60 ^A
Pharmaceutical and medicine manufacturing	213 ^A	178 ^A	391 ^A
Other chemicals manufacturing	116 ^A	53 ^A	169 ^A
Plastic product manufacturing	85 ^A	24 ^A	109 ^A
Rubber product manufacturing	x	x	19 ^A
Non-metallic mineral product manufacturing	28 ^A	31 ^A	58 ^A
Primary metal (ferrous) manufacturing	15 ^A	x	x
Primary metal (non-ferrous) manufacturing	x	89 ^A	x
Fabricated metal product manufacturing	142 ^A	27 ^A	169 ^A
Machinery manufacturing	418 ^A	123 ^A	541 ^A
Computer and peripheral equipment manufacturing	45 ^A	13 ^A	58 ^A
Communications equipment manufacturing	850 ^A	408 ^A	1,258 ^A
Semiconductor and other electronic component manufacturing	350 ^A	86 ^A	436 ^A
Navigational, measuring, medical and control instrument manufacturing	270 ^A	75 ^A	345 ^A
Other computer and electronic products manufacturing	21 ^A	7 ^A	29 ^A
Electrical equipment, appliance and component manufacturing	111 ^A	32 ^A	143 ^A
Motor vehicle and parts manufacturing	137 ^A	62 ^A	199 ^A
Aerospace products and parts manufacturing	x	891 ^A	x
All other transportation equipment manufacturing	96 ^A	45 ^A	142 ^A
Furniture and related product manufacturing	19 ^A	3 ^A	22 ^A
Other manufacturing industries	122 ^A	32 ^A	153 ^A
Services	5,280^A	1,665^A	6,945^A
Wholesale trade	866 ^A	432 ^A	1,299 ^A
Retail trade	55 ^A	x	x
Transportation and warehousing	43 ^A	x	x
Information and cultural industries	969 ^A	154 ^A	1,123 ^A
Finance, insurance and real estate	169 ^A	75 ^A	244 ^A
Architectural, engineering and related services	343 ^A	70 ^A	413 ^A
Computer systems design and related services	1,208 ^A	138 ^A	1,346 ^A
Management, scientific and technical consulting services	65 ^A	12 ^A	77 ^A
Scientific research and development services	1,164 ^A	594 ^A	1,758 ^A
Health care and social assistance	64 ^A	21 ^A	85 ^A
All other services	335 ^A	138 ^A	472 ^A

Note(s): Components may not add to totals due to rounding.

Table 6-3

Business enterprise research and development current intramural expenditures — By province

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Total	15,043 ^A	14,871 ^A	15,801 ^A	15,224 ^A	14,784 ^A
Atlantic Canada	313 ^A	256 ^A	259 ^A	253 ^A	205 ^B
Newfoundland and Labrador	80 ^B	64 ^A	x	91 ^C	x
Prince Edward Island	11 ^D	12 ^B	x	19 ^A	x
Nova Scotia	100 ^B	86 ^A	84 ^B	75 ^A	x
New Brunswick	122 ^B	94 ^A	93 ^B	68 ^A	58 ^A
Quebec	4,530 ^B	4,530 ^A	4,682 ^B	4,389 ^A	4,433 ^A
Ontario	6,903 ^A	6,796 ^A	7,279 ^B	7,135 ^A	6,714 ^A
Manitoba	184 ^C	214 ^B	197 ^B	219 ^A	189 ^A
Saskatchewan	142 ^B	149 ^B	201 ^A	204 ^A	235 ^A
Alberta	1,407 ^A	1,388 ^A	1,590 ^A	1,529 ^A	1,444 ^A
British Columbia and Territories ¹	1,564 ^A	1,538 ^A	1,593 ^A	1,496 ^A	1,563 ^A

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding.

Table 6-4

Business enterprise research and development current intramural expenditures — As a percentage of performing company revenues, by company revenue size

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	percent				
Total all revenue sizes	1.6	1.6	1.6	1.7	1.6
Less than \$1,000,000	34.3	x	x	x	x
\$1,000,000 to \$9,999,999	6.7	6.3	6.7	6.8	6.9
\$10,000,000 to \$49,999,999	3.1	3.3	3.5	3.7	3.8
\$50,000,000 to \$99,999,999	2.3	2.1	2.2	2.9	2.8
\$100,000,000 to \$399,999,999	1.8	1.6	2.0	2.4	2.1
Greater than \$399,999,999	0.9	1.0	0.9	0.9	0.9

Note(s): Revenue size is calculated for the year in which R&D expenditures occurred.

Table 6-5

Business enterprise research and development current intramural expenditures — As a percentage performing company revenues, by country of control

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	percent				
Total country of control	1.6	1.6	1.6	1.7	1.6
Canada	1.8	1.7	1.7	1.9	1.7
Foreign	1.4	1.5	1.5	1.4	1.4
United States	1.5	1.5	1.5	1.7	1.8
Other foreign	1.2	1.6	1.6	1.1	1.0

Table 6-6

Business enterprise research and development current intramural expenditures — As a percentage of performing company revenues, by industry and by country of control, 2013^a

	Canada	Foreign	Total country of control
	percent		
Total all industries	1.7	1.4	1.6
Agriculture, forestry, fishing and hunting	x	x	0.3
Agriculture	x	x	x
Forestry, logging and support activities for forestry	x	..	x
Fishing, hunting, trapping and animal aquaculture	x	..	x
Mining, quarrying, and oil and gas extraction	1.0	0.7	0.8
Oil and gas extraction, contract drilling and related services	1.1	0.7	0.9
Mining and quarrying, contract drilling and related support activities	0.7	0.6	0.6
Utilities	0.8	0.1	0.7
Electric power generation, transmission and distribution	x	x	x
Other utilities	x	x	x
Construction	x	x	0.8
Manufacturing	2.2	1.0	1.6
Food manufacturing	0.4	0.1	0.2
Beverage and tobacco product manufacturing	x	x	x
Textile mills and textile product mills	x	x	1.6
Wood product manufacturing	x	x	x
Paper manufacturing	1.3	0.5	0.9
Printing and related support activities	x	x	1.4
Petroleum and coal products manufacturing	x	x	0.1
Pharmaceutical and medicine manufacturing	2.6	5.6	3.5
Other chemicals manufacturing	1.2	0.4	0.6
Plastic product manufacturing	1.5	0.7	1.1
Rubber product manufacturing	x	x	0.3
Non-metallic mineral product manufacturing	1.6	0.6	0.8
Primary metal (ferrous) manufacturing	x	0.2	x
Primary metal (non-ferrous) manufacturing	x	1.3	x
Fabricated metal product manufacturing	1.4	0.8	1.2
Machinery manufacturing	3.2	2.1	2.9
Computer and peripheral equipment manufacturing	x	x	5.2
Communications equipment manufacturing	25.1	6.7	19.7
Semiconductor and other electronic component manufacturing	x	x	5.3
Navigational, measuring, medical and control instrument manufacturing	8.4	8.3	8.3
Other computer and electronic products manufacturing	x	x	7.1
Electrical equipment, appliance and component manufacturing	2.0	0.7	1.1
Motor vehicle and parts manufacturing	0.9	0.1	0.2
Aerospace products and parts manufacturing	x	x	x
All other transportation equipment manufacturing	2.4	1.5	2.2
Furniture and related product manufacturing	x	x	0.8
Other manufacturing industries	1.8	2.1	1.8
Services	1.7	3.0	2.0
Wholesale trade	0.5	2.3	1.3
Retail trade	x	x	x
Transportation and warehousing	x	x	x
Information and cultural industries	2.5	5.1	2.8
Finance, insurance and real estate	0.3	0.4	0.3
Architectural, engineering and related services	2.7	2.0	2.6
Computer systems design and related services	9.8	10.7	10.0
Management, scientific and technical consulting services	x	x	5.4
Scientific research and development services	42.6	22.3	28.9
Health care and social assistance	x	x	11.7
All other services	1.8	0.7	1.2

Table 7
Business enterprise research and development capital intramural expenditures by industry

	2011 ^f	2012 ^f	2013 ^p	2014 ^p	2015 ^p
	millions of dollars				
Total all industries	1,092^A	1,475^A	1,249^A	1,369^A	1,277^B
Agriculture, forestry, fishing and hunting	36^A	7^A	2^A	3^E	F
Agriculture	35 ^A	7 ^A	2 ^B	F	F
Forestry, logging and support activities for forestry	x	0 ^A	x	F	x
Fishing, hunting, trapping and animal aquaculture	x	0 ^A	x	0 ^C	x
Mining, quarrying, and oil and gas extraction	212^A	596^A	502^A	490^B	446^D
Oil and gas extraction, contract drilling and related services	211 ^A	593 ^A	496 ^A	479 ^A	436 ^B
Mining and quarrying, contract drilling and related support activities	1 ^A	3 ^A	6 ^A	F	F
Utilities	x	14^A	26^A	22^A	x
Electric power generation, transmission and distribution	x	x	x	x	x
Other utilities	1 ^D	x	x	x	F
Construction	x	17^A	3^A	3^E	x
Manufacturing	406^B	462^A	347^A	532^A	464^A
Food manufacturing	3 ^A	7 ^A	5 ^A	6 ^C	5 ^D
Beverage and tobacco product manufacturing	0 ^A	1 ^A	F	F	0 ^E
Textile mills and textile product mills	x	1 ^A	1 ^A	F	F
Wood product manufacturing	1 ^A	x	x	x	x
Paper manufacturing	2 ^A	2 ^A	1 ^A	x	F
Printing and related support activities	1 ^A	1 ^A	1 ^A	F	F
Petroleum and coal products manufacturing	x	3 ^A	x	x	x
Pharmaceutical and medicine manufacturing	21 ^D	25 ^B	12 ^A	12 ^B	16 ^C
Other chemicals manufacturing	20 ^A	24 ^D	8 ^B	F	F
Plastic product manufacturing	F	20 ^A	7 ^A	10 ^D	9 ^D
Rubber product manufacturing	F	5 ^A	1 ^A	F	F
Non-metallic mineral product manufacturing	3 ^A	1 ^A	1 ^C	F	F
Primary metal (ferrous) manufacturing	1 ^A	1 ^A	x	0 ^B	1 ^D
Primary metal (non-ferrous) manufacturing	1 ^A	x	x	F	x
Fabricated metal product manufacturing	15 ^A	17 ^A	18 ^A	21 ^B	19 ^C
Machinery manufacturing	28 ^B	21 ^A	15 ^A	52 ^A	50 ^B
Computer and peripheral equipment manufacturing	4 ^A	3 ^A	2 ^B	2 ^C	2 ^C
Communications equipment manufacturing	148 ^A	88 ^A	57 ^A	x	154 ^A
Semiconductor and other electronic component manufacturing	19 ^A	16 ^B	19 ^A	17 ^C	F
Navigational, measuring, medical and control instrument manufacturing	16 ^A	47 ^A	15 ^A	18 ^B	16 ^B
Other computer and electronic products manufacturing	0 ^A	4 ^A	0 ^A	F	F
Electrical equipment, appliance and component manufacturing	9 ^A	9 ^A	19 ^A	6 ^B	6 ^B
Motor vehicle and parts manufacturing	7 ^A	29 ^A	12 ^A	10 ^D	15 ^C
Aerospace products and parts manufacturing	x	x	x	x	x
All other transportation equipment manufacturing	5 ^A	3 ^A	4 ^A	3 ^B	4 ^D
Furniture and related product manufacturing	2 ^A	1 ^A	1 ^A	0 ^C	0 ^E
Other manufacturing industries	17 ^B	11 ^D	7 ^A	10 ^C	10 ^D
Services	396^B	379^A	369^A	319^A	340^A
Wholesale trade	54 ^A	65 ^A	38 ^A	38 ^D	30 ^B
Retail trade	10 ^A	2 ^A	x	x	F
Transportation and warehousing	4 ^A	1 ^A	x	4 ^C	4 ^D
Information and cultural industries	70 ^A	65 ^A	126 ^A	108 ^B	110 ^A
Finance, insurance and real estate	17 ^A	22 ^A	21 ^A	x	20 ^E
Architectural, engineering and related services	16 ^A	26 ^B	28 ^A	F	14 ^D
Computer systems design and related services	80 ^E	45 ^B	32 ^A	33 ^B	34 ^C
Management, scientific and technical consulting services	6 ^B	3 ^A	3 ^A	4 ^D	4 ^C
Scientific research and development services	89 ^A	120 ^A	78 ^A	74 ^A	76 ^B
Health care and social assistance	9 ^A	6 ^A	2 ^B	1 ^C	5 ^B
All other services	41 ^C	24 ^A	26 ^A	26 ^C	43 ^D

Note(s): Components may not add to totals due to rounding.

Table 8-1

Business enterprise research and development personnel — By industry group and by region, 2013^p

	Atlantic Canada	Quebec	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia and Territories ¹	Total
	number							
Total all industries	1,997^A	41,981^A	60,727^A	1,936^A	1,527^B	8,913^A	15,251^A	132,331^A
Agriculture, forestry, fishing and hunting	94 ^A	353 ^A	247 ^A	21 ^A	16 ^A	111 ^A	180 ^A	1,024 ^A
Mining, quarrying, and oil and gas extraction	x	113 ^C	249 ^A	x	50 ^D	1,248 ^A	156 ^B	1,840 ^A
Utilities	x	574 ^A	621 ^A	x	14 ^A	53 ^A	28 ^B	1,328 ^D
Construction	12 ^B	336 ^A	437 ^A	10 ^C	20 ^B	161 ^A	96 ^A	1,072 ^A
Manufacturing	573 ^A	19,697 ^A	26,863 ^A	624 ^A	660 ^A	1,479 ^A	3,683 ^A	53,579 ^A
Services	1,274 ^B	20,908 ^A	32,308 ^A	1,262 ^A	767 ^D	5,861 ^A	11,108 ^A	73,489 ^A

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 8-2

Business enterprise research and development personnel — By province and by occupational category, 2013^p

	Research and development professionals	Research and development technical and administrative support staff ¹	Total research and development personnel
	number		
Total	89,165^A	43,166	132,331^A
Atlantic Canada	1,261 ^A	736 ^B	1,997 ^A
Newfoundland and Labrador	329 ^B	F	455 ^C
Prince Edward Island	91 ^B	100 ^C	191 ^B
Nova Scotia	463 ^B	266 ^A	729 ^B
New Brunswick	378 ^B	244 ^A	622 ^A
Quebec	24,891 ^A	17,090 ^A	41,981 ^A
Ontario	43,882 ^A	16,845 ^A	60,727 ^A
Manitoba	1,220 ^A	715 ^A	1,936 ^A
Saskatchewan	937 ^C	590 ^B	1,527 ^B
Alberta	5,959 ^A	2,954 ^A	8,913 ^A
British Columbia and Territories ²	11,014 ^A	4,237 ^A	15,251 ^A

1. Includes technicians and other.

2. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 8-3

Business enterprise research and development personnel — By industry and by occupational category, 2013^p

	Research and development professionals	Research and development technicians and technologists	Research and development other support staff	Total research and development personnel
	number			
Total all industries	89,165^A	33,551^A	9,615^A	132,331^A
Agriculture, forestry, fishing and hunting	507^A	414^A	103^A	1,024^A
Agriculture	421 ^A	368 ^A	86 ^A	874 ^A
Forestry, logging and support activities for forestry	48 ^A	20 ^A	11 ^A	80 ^A
Fishing, hunting, trapping and animal aquaculture	38 ^A	26 ^A	6 ^A	70 ^A
Mining, quarrying, and oil and gas extraction	1,087^A	446^A	307^A	1,840^A
Oil and gas extraction, contract drilling and related services	775 ^A	280 ^B	235 ^B	1,290 ^A
Mining and quarrying, contract drilling and related support activities	312 ^A	166 ^A	73 ^A	550 ^A
Utilities	845^E	F	161^E	1,328^D
Electric power generation, transmission and distribution	718 ^E	x	x	1,016 ^E
Other utilities	128 ^A	x	x	311 ^A
Construction	614^A	386^A	72^A	1,072^A
Manufacturing	33,703^A	14,709^A	5,167^A	53,579^A
Food manufacturing	815 ^A	649 ^A	269 ^A	1,733 ^A
Beverage and tobacco product manufacturing	55 ^A	45 ^A	6 ^B	105 ^A
Textile mills and textile product mills	151 ^A	175 ^A	48 ^A	374 ^A
Wood product manufacturing	218 ^A	215 ^A	35 ^B	467 ^A
Paper manufacturing	277 ^A	290 ^A	83 ^A	649 ^A
Printing and related support activities	301 ^A	395 ^A	54 ^A	749 ^A
Petroleum and coal products manufacturing	166 ^A	37 ^A	4 ^A	207 ^A
Pharmaceutical and medicine manufacturing	1,582 ^A	1,348 ^A	192 ^A	3,122 ^A
Other chemicals manufacturing	1,137 ^A	510 ^A	110 ^A	1,757 ^A
Plastic product manufacturing	761 ^A	600 ^A	121 ^A	1,482 ^A
Rubber product manufacturing	153 ^A	61 ^B	F	220 ^B
Non-metallic mineral product manufacturing	275 ^A	195 ^A	32 ^B	503 ^A
Primary metal (ferrous) manufacturing	117 ^A	x	x	243 ^A
Primary metal (non-ferrous) manufacturing	319 ^A	x	x	524 ^A
Fabricated metal product manufacturing	1,331 ^A	1,180 ^A	230 ^B	2,740 ^A
Machinery manufacturing	3,552 ^A	2,331 ^A	478 ^A	6,362 ^A
Computer and peripheral equipment manufacturing	483 ^A	x	x	680 ^A
Communications equipment manufacturing	7,788 ^A	481 ^A	360 ^A	8,628 ^A
Semiconductor and other electronic component manufacturing	2,857 ^A	758 ^A	200 ^A	3,815 ^A
Navigational, measuring, medical and control instrument manufacturing	3,006 ^A	733 ^A	156 ^A	3,894 ^A
Other computer and electronic products manufacturing	302 ^A	x	x	371 ^A
Electrical equipment, appliance and component manufacturing	1,075 ^A	659 ^A	109 ^B	1,843 ^D
Motor vehicle and parts manufacturing	1,057 ^A	581 ^A	237 ^A	1,875 ^A
Aerospace products and parts manufacturing	3,535 ^A	x	x	7,015 ^A
All other transportation equipment manufacturing	968 ^A	381 ^A	161 ^A	1,510 ^A
Furniture and related product manufacturing	211 ^A	218 ^A	52 ^A	481 ^A
Other manufacturing industries	1,214 ^A	826 ^A	189 ^A	2,229 ^A
Services	52,409^A	17,275^A	3,805^A	73,489^A
Wholesale trade	7,430 ^A	1,954 ^A	747 ^A	10,132 ^A
Retail trade	571 ^A	399 ^A	65 ^A	1,034 ^A
Transportation and warehousing	426 ^A	168 ^A	25 ^A	619 ^A
Information and cultural industries	8,903 ^A	3,635 ^A	540 ^A	13,078 ^A
Finance, insurance and real estate	1,414 ^A	325 ^C	43 ^B	1,783 ^B
Architectural, engineering and related services	3,718 ^A	1,068 ^A	305 ^A	5,090 ^A
Computer systems design and related services	12,801 ^A	4,046 ^A	532 ^A	17,379 ^A
Management, scientific and technical consulting services	885 ^A	316 ^A	50 ^A	1,250 ^A
Scientific research and development services	11,631 ^A	3,399 ^A	997 ^A	16,028 ^A
Health care and social assistance	860 ^A	294 ^A	84 ^A	1,238 ^A
All other services	3,768 ^A	1,672 ^A	418 ^B	5,858 ^A

Note(s): Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 8-4

Business enterprise research and development personnel — By occupational category

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	number				
Total research and development personnel	155,172 ^A	144,270 ^A	148,934 ^A	139,462 ^A	132,331 ^A
Research and development professionals	93,357 ^A	94,528 ^A	99,037 ^A	94,005 ^A	89,165 ^A
Research and development technicians and technologists	47,187 ^A	38,567 ^A	40,384 ^A	34,844 ^A	33,551 ^A
Research and development other support staff	14,628 ^A	11,175 ^A	9,513 ^A	10,613 ^A	9,615 ^A

Note(s): Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 8-5

Business enterprise research and development personnel — By field of science or technology

	2012 ^r	2013 ^p
	number	
Total	139,462 ^A	132,331 ^A
Natural and formal sciences	16,559 ^A	14,480 ^A
Mathematics	532 ^A	457 ^A
Computer and information sciences	9,462 ^A	7,584 ^A
Physical sciences	1,131 ^A	1,261 ^A
Chemical sciences	2,639 ^A	2,466 ^A
Earth and related environmental sciences	1,159 ^B	1,231 ^A
Biological sciences	1,543 ^A	1,388 ^A
Other natural sciences	93 ^A	92 ^A
Engineering and technology	108,767 ^A	103,555 ^A
Civil engineering	1,355 ^A	1,008 ^A
Software engineering	30,282 ^A	29,011 ^A
Electrical engineering, electronic engineering and information technology	29,101 ^A	27,459 ^A
Mechanical engineering	22,375 ^A	17,884 ^A
Chemical engineering	2,749 ^A	2,722 ^A
Materials engineering	7,053 ^A	5,902 ^A
Medical engineering	756 ^A	719 ^A
Environmental engineering	2,409 ^A	2,375 ^A
Environmental biotechnology	176 ^B	161 ^A
Industrial biotechnology	703 ^B	359 ^A
Nano-technology	147 ^A	122 ^A
Other engineering and technologies	11,662 ^A	15,834 ^A
Medical and health sciences	11,039 ^A	11,000 ^A
Basic medicine	3,524 ^A	3,650 ^A
Clinical medicine	1,987 ^A	1,666 ^A
Health sciences	979 ^B	1,079 ^A
Medical biotechnology	2,208 ^A	2,296 ^A
Other medical sciences	2,341 ^A	2,308 ^A
Agricultural sciences	3,097 ^A	3,297 ^A
Agriculture, forestry, and fisheries	1,609 ^A	2,085 ^A
Animal and dairy science	549 ^A	452 ^A
Veterinary science	78 ^C	81 ^A
Agricultural biotechnology	467 ^A	395 ^A
Other agricultural sciences	394 ^A	284 ^A

Note(s): Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 8-6

Business enterprise research and development personnel — By major fields of science or technology and industry, 2013^p

	Natural and formal sciences	Engineering and technology	Medical and health sciences	Agricultural sciences	Total
	number				
Total all industries	14,480^A	103,555^A	11,000^A	3,297^A	132,331^A
Agriculture, forestry, fishing and hunting	x	153^A	x	730^A	1,024^A
Agriculture	114 ^A	110 ^A	3 ^E	648 ^A	874 ^A
Forestry, logging and support activities for forestry	x	33 ^A	x	x	80 ^A
Fishing, hunting, trapping and animal aquaculture	6 ^A	10 ^A	x	x	70 ^A
Mining, quarrying, and oil and gas extraction	x	1,620^A	0^A	x	1,840^A
Oil and gas extraction, contract drilling and related services	x	1,112 ^A	0 ^A	x	1,290 ^A
Mining and quarrying, contract drilling and related support activities	x	508 ^A	0 ^A	x	550 ^A
Utilities	122^A	1,194^A	x	x	1,328^D
Electric power generation, transmission and distribution	x	x	0 ^A	0 ^A	1,016 ^E
Other utilities	x	x	x	x	311 ^A
Construction	x	988^A	0^A	x	1,072^A
Manufacturing	2,994^A	46,583^A	3,145^A	857^A	53,579^A
Food manufacturing	116 ^A	1,137 ^A	17 ^A	462 ^A	1,733 ^A
Beverage and tobacco product manufacturing	x	x	x	21 ^A	105 ^A
Textile mills and textile product mills	x	350 ^A	x	x	374 ^A
Wood product manufacturing	x	425 ^A	x	18 ^A	467 ^A
Paper manufacturing	x	x	x	5 ^A	649 ^A
Printing and related support activities	92 ^A	658 ^A	0 ^A	0 ^A	749 ^A
Petroleum and coal products manufacturing	x	150 ^A	0 ^A	x	207 ^A
Pharmaceutical and medicine manufacturing	488 ^A	x	2,532 ^A	x	3,122 ^A
Other chemicals manufacturing	540 ^A	891 ^A	93 ^A	233 ^A	1,757 ^A
Plastic product manufacturing	x	1,380 ^A	x	0 ^A	1,482 ^A
Rubber product manufacturing	22 ^A	198 ^A	0 ^A	0 ^A	220 ^B
Non-metallic mineral product manufacturing	27 ^C	x	0 ^A	x	503 ^A
Primary metal (ferrous) manufacturing	x	x	x	0 ^A	243 ^A
Primary metal (non-ferrous) manufacturing	x	x	0 ^A	0 ^A	524 ^A
Fabricated metal product manufacturing	62 ^A	2,672 ^A	4 ^B	2 ^A	2,740 ^A
Machinery manufacturing	184 ^A	6,098 ^A	x	x	6,362 ^A
Computer and peripheral equipment manufacturing	x	601 ^A	x	0 ^A	680 ^A
Communications equipment manufacturing	105 ^A	8,523 ^A	0 ^A	0 ^A	8,628 ^A
Semiconductor and other electronic component manufacturing	144 ^A	3,664 ^A	x	x	3,815 ^A
Navigational, measuring, medical and control instrument manufacturing	536 ^A	3,204 ^A	x	x	3,894 ^A
Other computer and electronic products manufacturing	x	334 ^A	x	0 ^A	371 ^A
Electrical equipment, appliance and component manufacturing	166 ^A	1,666 ^A	5 ^A	6 ^A	1,843 ^D
Motor vehicle and parts manufacturing	x	x	x	0 ^A	1,875 ^A
Aerospace products and parts manufacturing	x	7,005 ^A	x	0 ^A	7,015 ^A
All other transportation equipment manufacturing	x	x	0 ^A	0 ^A	1,510 ^A
Furniture and related product manufacturing	x	471 ^A	0 ^A	x	481 ^A
Other manufacturing industries	121 ^B	1,788 ^A	311 ^A	9 ^D	2,229 ^A
Services	10,945^A	53,018^A	7,841^A	1,686^A	73,489^A
Wholesale trade	828 ^A	7,365 ^A	1,546 ^A	393 ^A	10,132 ^A
Retail trade	156 ^A	815 ^A	36 ^A	28 ^A	1,034 ^A
Transportation and warehousing	90 ^A	522 ^A	0 ^A	7 ^B	619 ^A
Information and cultural industries	1,846 ^A	11,115 ^A	x	x	13,078 ^A
Finance, insurance and real estate	270 ^A	1,496 ^A	x	x	1,783 ^B
Architectural, engineering and related services	1,026 ^A	3,997 ^A	28 ^E	39 ^D	5,090 ^A
Computer systems design and related services	3,948 ^A	13,220 ^A	195 ^A	15 ^B	17,379 ^A
Management, scientific and technical consulting services	381 ^A	789 ^A	57 ^A	23 ^B	1,250 ^A
Scientific research and development services	1,701 ^A	8,943 ^A	4,559 ^A	825 ^A	16,028 ^A
Health care and social assistance	57 ^A	131 ^A	1,044 ^A	5 ^A	1,238 ^A
All other services	643 ^A	4,623 ^A	259 ^A	332 ^A	5,858 ^A

Note(s): Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 9
Business enterprise research and development professional personnel, by level of education

	Bachelors	Masters	Doctorates	College	Without college or university diploma	Total level of education
	number					
2013 ^p	54,650 ^A	15,385 ^A	7,996 ^B	8,299 ^B	2,834 ^B	89,165 ^A
2012 ^r	56,335 ^A	17,110 ^A	9,662 ^B	7,985 ^A	2,913 ^A	94,005 ^A
2011 ^r	59,540 ^A	18,693 ^A	9,471 ^A	7,968 ^A	3,366 ^A	99,037 ^A
2010	56,522 ^A	17,014 ^A	8,126 ^A	7,881 ^B	4,985 ^A	94,528 ^A
2009	57,503 ^A	13,989 ^A	6,924 ^A	10,174 ^A	4,767 ^A	93,357 ^A

Note(s): Data are estimated for all performing companies not surveyed directly, i.e. all data points taken from performers for whom data were obtained through the tax data (see Survey Methodology). Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 10-1

Business enterprise research and development extramural payments by industry — And by year

	2009	2010	2011 ^r	2012 ^r	2013 ^p
	millions of dollars				
Total all industries	3,681^A	2,928^A	2,994^A	3,169^A	3,310^A
Agriculture, forestry, fishing and hunting	21^A	18^A	x	13^A	x
Agriculture	13 ^A	13 ^A	x	10 ^A	8 ^A
Forestry, logging and support activities for forestry	4 ^A	x	x	2 ^A	x
Fishing, hunting, trapping and animal aquaculture	3 ^A	x	1 ^A	2 ^A	1 ^A
Mining, quarrying, and oil and gas extraction	98^A	155^B	140^C	210^A	192^B
Oil and gas extraction, contract drilling and related services	65 ^A	127 ^B	104 ^D	172 ^A	158 ^C
Mining and quarrying, contract drilling and related support activities	33 ^A	28 ^D	36 ^A	38 ^A	35 ^A
Utilities	106^A	99^D	112^A	130^A	x
Electric power generation, transmission and distribution	100 ^A	91 ^D	105 ^A	x	x
Other utilities	7 ^A	8 ^A	6 ^A	x	x
Construction	25^D	20^A	x	16^A	x
Manufacturing	1,193^A	822^A	935^A	755^A	992^B
Food manufacturing	26 ^A	26 ^A	19 ^D	19 ^A	x
Beverage and tobacco product manufacturing	4 ^A	3 ^A	2 ^A	4 ^A	1 ^A
Textile mills and textile product mills	3 ^A	2 ^A	x	x	1 ^A
Wood product manufacturing	21 ^A	12 ^A	x	x	13 ^A
Paper manufacturing	15 ^A	13 ^A	x	18 ^A	18 ^A
Printing and related support activities	3 ^A	2 ^A	3 ^A	2 ^C	2 ^A
Petroleum and coal products manufacturing	12 ^A	10 ^A	x	x	x
Pharmaceutical and medicine manufacturing	457 ^A	170 ^A	107 ^A	158 ^A	182 ^A
Other chemicals manufacturing	107 ^B	88 ^A	x	75 ^A	59 ^E
Plastic product manufacturing	19 ^C	16 ^A	15 ^A	15 ^A	x
Rubber product manufacturing	3 ^A	3 ^A	1 ^A	4 ^A	3 ^A
Non-metallic mineral product manufacturing	7 ^E	10 ^A	6 ^A	5 ^A	5 ^A
Primary metal (ferrous) manufacturing	5 ^B	x	x	x	x
Primary metal (non-ferrous) manufacturing	17 ^A	21 ^A	x	x	x
Fabricated metal product manufacturing	26 ^A	24 ^A	x	x	x
Machinery manufacturing	59 ^A	x	x	55 ^A	x
Computer and peripheral equipment manufacturing	4 ^A	4 ^A	x	9 ^A	x
Communications equipment manufacturing	144 ^A	86 ^A	103 ^D	43 ^A	x
Semiconductor and other electronic component manufacturing	14 ^A	15 ^A	x	x	x
Navigational, measuring, medical and control instrument manufacturing	32 ^A	43 ^A	84 ^A	28 ^A	56 ^A
Other computer and electronic products manufacturing	2 ^E	2 ^A	2 ^A	3 ^A	3 ^A
Electrical equipment, appliance and component manufacturing	21 ^A	16 ^A	10 ^A	x	x
Motor vehicle and parts manufacturing	79 ^C	69 ^C	84 ^A	x	x
Aerospace products and parts manufacturing	70 ^B	97 ^A	162 ^A	x	x
All other transportation equipment manufacturing	13 ^D	11 ^A	7 ^A	x	x
Furniture and related product manufacturing	5 ^A	5 ^A	3 ^A	2 ^A	1 ^A
Other manufacturing industries	25 ^A	23 ^A	30 ^A	39 ^A	x
Services	2,238^A	1,814^A	1,750^A	2,044^A	1,879^A
Wholesale trade	611 ^A	408 ^A	308 ^A	444 ^A	407 ^A
Retail trade	15 ^A	x	16 ^A	15 ^A	10 ^A
Transportation and warehousing	49 ^A	x	27 ^A	29 ^B	42 ^A
Information and cultural industries	553 ^B	536 ^A	462 ^A	394 ^A	387 ^A
Finance, insurance and real estate	123 ^A	94 ^A	91 ^D	304 ^B	279 ^A
Architectural, engineering and related services	84 ^A	x	73 ^A	70 ^A	65 ^A
Computer systems design and related services	154 ^C	152 ^A	275 ^A	276 ^A	151 ^A
Management, scientific and technical consulting services	21 ^A	x	27 ^A	29 ^A	30 ^A
Scientific research and development services	511 ^A	347 ^A	336 ^A	365 ^A	353 ^A
Health care and social assistance	36 ^A	29 ^A	36 ^A	36 ^A	47 ^A
All other services	81 ^A	x	98 ^A	81 ^A	110 ^A

Note(s): Extramural payments are expenditures made for R&D performed by other organizations in Canada and/or in other countries. Other organizations include parent, affiliated and subsidiary companies, other non-related companies, private non-profit organizations, universities, hospitals, industrial research institutes or associations, provincial research organizations, and other organizations including governments and individuals. Extramural R&D payments include expenditures by companies that performed R&D and companies that only made payments for R&D to other organizations. Components may not add to totals due to rounding. Tax data include extramural payments for R&D in Canada only; extramural payments for R&D outside of Canada were imputed for these records (see Survey Methodology).

Table 10-2

Business enterprise research and development extramural payments by industry — And by location of recipient, 2013^a

	Canada	Foreign	Total location of recipient
millions of dollars			
Total all industries	2,613^A	697^B	3,310^A
Agriculture, forestry, fishing and hunting	x	x	x
Agriculture	x	x	8 ^A
Forestry, logging and support activities for forestry	x	0 ^A	x
Fishing, hunting, trapping and animal aquaculture	1 ^A	0 ^A	1 ^A
Mining, quarrying, and oil and gas extraction	x	x	192^B
Oil and gas extraction, contract drilling and related services	140 ^C	18 ^C	158 ^C
Mining and quarrying, contract drilling and related support activities	x	x	35 ^A
Utilities	x	x	x
Electric power generation, transmission and distribution	x	x	x
Other utilities	x	x	x
Construction	x	x	x
Manufacturing	663^A	329^B	992^B
Food manufacturing	11 ^A	x	x
Beverage and tobacco product manufacturing	1 ^A	0 ^A	1 ^A
Textile mills and textile product mills	1 ^A	0 ^A	1 ^A
Wood product manufacturing	13 ^A	F	13 ^A
Paper manufacturing	18 ^A	0 ^A	18 ^A
Printing and related support activities	2 ^A	0 ^A	2 ^A
Petroleum and coal products manufacturing	8 ^A	x	x
Pharmaceutical and medicine manufacturing	138 ^A	44 ^E	182 ^A
Other chemicals manufacturing	59 ^E	F	59 ^E
Plastic product manufacturing	17 ^A	x	x
Rubber product manufacturing	3 ^A	0 ^A	3 ^A
Non-metallic mineral product manufacturing	5 ^A	0 ^A	5 ^A
Primary metal (ferrous) manufacturing	x	x	x
Primary metal (non-ferrous) manufacturing	18 ^A	x	x
Fabricated metal product manufacturing	15 ^A	x	x
Machinery manufacturing	48 ^A	x	x
Computer and peripheral equipment manufacturing	4 ^A	x	x
Communications equipment manufacturing	x	x	x
Semiconductor and other electronic component manufacturing	13 ^A	x	x
Navigational, measuring, medical and control instrument manufacturing	x	x	56 ^A
Other computer and electronic products manufacturing	3 ^A	0 ^A	3 ^A
Electrical equipment, appliance and component manufacturing	12 ^B	x	x
Motor vehicle and parts manufacturing	F	x	x
Aerospace products and parts manufacturing	152 ^A	x	x
All other transportation equipment manufacturing	8 ^A	x	x
Furniture and related product manufacturing	1 ^A	0 ^A	1 ^A
Other manufacturing industries	21 ^A	x	x
Services	1,535^A	344^C	1,879^A
Wholesale trade	x	x	407 ^A
Retail trade	x	x	10 ^A
Transportation and warehousing	x	x	42 ^A
Information and cultural industries	285 ^A	102 ^C	387 ^A
Finance, insurance and real estate	279 ^A	0 ^A	279 ^A
Architectural, engineering and related services	x	x	65 ^A
Computer systems design and related services	132 ^A	F	151 ^A
Management, scientific and technical consulting services	x	x	30 ^A
Scientific research and development services	265 ^A	88 ^D	353 ^A
Health care and social assistance	x	x	47 ^A
All other services	89 ^A	21 ^D	110 ^A

Note(s): Extramural payments are expenditures made for R&D performed by other organizations in Canada and/or in other countries. Other organizations include parent, affiliated and subsidiary companies, other non-related companies, private non-profit organizations, universities, hospitals, industrial research institutes or associations, provincial research organizations, and other organizations including governments and individuals. Extramural R&D payments include expenditures by companies that performed R&D and companies that only made payments for R&D to other organizations. Components may not add to totals due to rounding. Tax data include extramural payments for R&D in Canada only; extramural payments for R&D outside of Canada were imputed for these records (see Survey Methodology).

Table 11**Business enterprise foreign receipts and payments for technological services by research and development and other**

	Receipts			Payments			Balance		
	Research and development, foreign receipts	Other foreign receipts	Total foreign receipts	Research and development, foreign payments	Other foreign payments	Total foreign payments	Research and development, balance	Other, balance	Total balance
	millions of dollars								
2013 ^p	1,741	958	2,699	697	567	1,264	1,044	391	1,435
2012 ^r	1,718	917	2,635	418	474	892	1,300	444	1,743
2011 ^r	1,758	867	2,625	416	340	756	1,342	527	1,869
2010	1,853	1,239	3,091	376	207	583	1,477	1,032	2,509
2009	2,003	634	2,637	627	315	941	1,376	320	1,696
2008	2,082	857	2,939	873	239	1,112	1,209	619	1,827
2007	2,663	709	3,372	1,302	339	1,641	1,361	370	1,731
2006	2,113	721	2,834	1,054	336	1,390	1,059	385	1,444
2005	2,327	754	3,081	1,146	317	1,463	1,181	438	1,618
2004	2,280	1,260	3,539	1,127	401	1,528	1,153	859	2,012

Note(s): Data are from Research and Development in Canadian Industry survey respondents only. Components may not add to totals due to rounding.

Table 12**Business enterprise expenditures made and payments received for intellectual property and other technology-related services, 2013^p**

	Expenditures made	Payments received
	millions of dollars	
Total intellectual property and other technology related services	1,017	1,487
Patents	486	1,024
Copyrights	1	x
Trademarks	36	x
Industrial designs and integrated circuit topography designs	40	26
Technical assistance, industrial processes and know-how	453	428

Note(s): Data are from the Research and Development in Canadian Industry respondents only. Components may not add to totals due to rounding. Personnel counts are reported as full-time equivalent.

Table 13

Business enterprise energy research and development intramural expenditures and extramural payments made outside of Canada, by area of technology, 2013^p

	Total intramural research and development	Total extramural payments outside of Canada
	millions of dollars	
Total energy technologies	2,042	29
Fossil fuels	1,449	10
Crude oils and natural gas	503	1
Oil sands and heavy crude oil	888	x
Refining, processing and upgrading	x	x
Coal production, preparation and processing	1	0
Transportation of fossil fuels	x	x
Renewable energy resources	120	2
Solar	x	x
Wind-energy	x	0
Bio-energy	40	x
Hydro	36	x
Other renewable energy	10	x
Nuclear fission and fusion	77	2
Electric Power	85	1
Generation in utility sector	21	x
Combine heat and power in industry, buildings	2	0
Electricity transmission, distribution and storage	62	x
Hydrogen and fuel cells	74	x
Hydrogen	x	x
Fuel cells	x	x
Energy efficiency	128	1
Industry	77	0
Residential, institutional and commercial	13	x
Transportation	17	x
Other energy efficiency	21	x
Other energy-related technologies	110	x

Note(s): Data are from the Energy Research and Development Expenditures by Area of Technology survey. Components may not add to totals due to rounding.

Table 14-1

Research and development performers — By industry and by country of control, 2012p

	Canada	Foreign	Total country of control
	number		
Total all industries	20,878	1,114	21,992
Agriculture, forestry, fishing and hunting	X	X	752
Agriculture	X	X	670
Forestry, logging and support activities for forestry	X	X	36
Fishing, hunting, trapping and animal aquaculture	X	X	46
Mining, quarrying, and oil and gas extraction	186	43	229
Oil and gas extraction, contract drilling and related services	116	24	140
Mining and quarrying, contract drilling and related support activities	70	19	89
Utilities	X	X	147
Electric power generation, transmission and distribution	X	X	34
Other utilities	X	X	113
Construction	675	19	694
Manufacturing	7,584	479	8,163
Food manufacturing	535	35	570
Beverage and tobacco product manufacturing	X	X	80
Textile mills and textile product mills	X	X	133
Wood product manufacturing	X	X	243
Paper manufacturing	107	22	129
Printing and related support activities	X	X	314
Petroleum and coal products manufacturing	X	X	33
Pharmaceutical and medicine manufacturing	99	23	122
Other chemicals manufacturing	406	63	469
Plastic product manufacturing	431	44	475
Rubber product manufacturing	X	X	63
Non-metallic mineral product manufacturing	182	20	202
Primary metal (ferrous) manufacturing	X	X	69
Primary metal (non-ferrous) manufacturing	X	X	73
Fabricated metal product manufacturing	1,109	45	1,154
Machinery manufacturing	1,325	64	1,389
Computer and peripheral equipment manufacturing	X	X	90
Communications equipment manufacturing	X	X	134
Semiconductor and other electronic component manufacturing	155	15	170
Navigational, measuring, medical and control instrument manufacturing	300	33	333
Other computer and electronic products manufacturing	X	X	65
Electrical equipment, appliance and component manufacturing	273	37	310
Motor vehicle and parts manufacturing	238	35	273
Aerospace products and parts manufacturing	65	18	83
All other transportation equipment manufacturing	X	X	91
Furniture and related product manufacturing	X	X	266
Other manufacturing industries	805	25	830
Services	11,549	442	12,007
Wholesale trade	1,736	129	1,865
Retail trade	X	X	534
Transportation and warehousing	X	X	178
Information and cultural industries	1,244	70	1,314
Finance, insurance and real estate	352	16	368
Architectural, engineering and related services	933	35	968
Computer systems design and related services	2,882	100	2,982
Management, scientific and technical consulting services	X	X	570
Scientific research and development services	944	54	998
Health care and social assistance	X	X	520
All other services	1,672	38	1,710

Table 14-2
Research and development performers — By province, 2008 to 2012

	2008	2009	2010	2011 ^f	2012 ^p	Absolute change from 2008 to 2012	Change from 2008 to 2012
	number						percent
Canada - total	24,753	25,915	25,248	24,183	21,992	-2,761	-11
Total - Multi-province	26,440	27,353	26,538	25,513	23,163	-3,277	-12
Atlantic Canada	1,097	1,150	979	1,026	919	-178	-16
Newfoundland and Labrador	178	180	159	153	150	-28	-16
Prince Edward Island	96	102	84	85	76	-20	-21
Nova Scotia	480	508	426	455	390	-90	-19
New Brunswick	343	360	310	333	303	-40	-12
Quebec	9,114	9,136	8,219	8,301	7,483	-1,631	-18
Ontario	10,694	10,820	11,999	10,163	9,145	-1,549	-14
Manitoba	531	592	499	536	498	-33	-6
Saskatchewan	369	446	389	447	402	33	9
Alberta	1,740	1,963	1,659	1,908	1,814	74	4
British Columbia ¹	2,895	3,246	2,794	3,132	2,902	7	0

1. Includes Yukon, Northwest Territories and Nunavut.

Note(s): Caution should be used when making any comparison of counts of provincial firms with R&D activities.

Table 14-3

Research and development performers — As a percentage of enterprises with one or more employees, 2008 to 2012

	2008	2009	2010	2011 ^r	2012 ^p
	percent				
Total all industries	2.5	2.6	2.5	2.4	2.2
Agriculture, forestry, fishing and hunting	2.2	2.2	2.1	1.8	1.4
Agriculture	2.6	2.6	2.4	2.0	1.6
Forestry, logging and support activities for forestry	1.2	1.3	1.2	0.9	0.6
Fishing, hunting, trapping and animal aquaculture	1.0	1.1	1.0	0.9	0.9
Mining, quarrying, and oil and gas extraction	2.6	2.8	3.1	2.9	2.8
Oil and gas extraction, contract drilling and related services	2.0	2.3	2.5	2.5	2.3
Mining and quarrying, contract drilling and related support activities	5.0	4.9	5.4	4.4	4.3
Utilities	5.0	5.3	4.8	5.3	4.2
Electric power generation, transmission and distribution	9.6	10.9	10.5	13.4	11.0
Other utilities	4.5	4.7	4.2	4.4	3.6
Construction	0.7	0.8	0.7	0.7	0.5
Manufacturing	19.7	20.3	20.0	19.0	17.3
Food manufacturing	15.6	16.0	15.8	13.9	12.2
Beverage and tobacco product manufacturing	14.7	15.8	15.8	12.2	12.6
Textile mills and textile product mills	13.9	13.9	14.6	13.2	12.6
Wood product manufacturing	10.7	10.8	10.1	8.9	7.5
Paper manufacturing	28.3	26.8	29.9	29.1	26.4
Printing and related support activities	9.4	10.4	10.0	9.3	8.2
Petroleum and coal products manufacturing	30.2	38.8	31.6	37.2	23.7
Pharmaceutical and medicine manufacturing	46.7	44.4	45.6	46.4	47.5
Other chemicals manufacturing	36.0	35.1	34.6	34.4	34.7
Plastic product manufacturing	34.2	34.7	35.0	32.8	29.1
Rubber product manufacturing	26.4	25.9	29.4	28.9	26.0
Non-metallic mineral product manufacturing	14.0	14.6	14.3	14.2	12.0
Primary metal (ferrous) manufacturing	29.4	26.6	25.5	31.9	26.2
Primary metal (non-ferrous) manufacturing	35.5	37.7	35.3	31.9	30.4
Fabricated metal product manufacturing	19.2	20.0	19.1	18.0	15.5
Machinery manufacturing	33.5	34.4	33.9	33.0	30.1
Computer and peripheral equipment manufacturing	39.0	37.3	39.7	41.7	40.0
Communications equipment manufacturing	57.3	52.9	54.3	50.9	52.3
Semiconductor and other electronic component manufacturing	47.7	47.1	47.8	46.6	44.9
Navigational, measuring, medical and control instrument manufacturing	49.9	51.6	52.2	52.6	50.2
Other computer and electronic products manufacturing	30.7	28.0	32.4	38.9	38.2
Electrical equipment, appliance and component manufacturing	33.9	34.3	33.1	33.1	32.4
Motor vehicle and parts manufacturing	30.0	29.8	29.3	27.8	25.2
Aerospace products and parts manufacturing	40.4	41.0	44.8	43.9	34.9
All other transportation equipment manufacturing	19.6	23.1	21.6	22.5	19.9
Furniture and related product manufacturing	10.0	10.5	9.5	7.8	6.9
Other manufacturing industries	12.3	13.2	13.6	13.0	11.7
Services	1.6	1.7	1.7	1.7	1.6
Wholesale trade	4.3	4.6	4.5	4.3	3.9
Retail trade	0.6	0.6	0.6	0.6	0.5
Transportation and warehousing	0.5	0.5	0.5	0.5	0.4
Information and cultural industries	8.5	9.3	9.7	10.6	10.9
Finance, insurance and real estate	0.6	0.7	0.6	0.6	0.5
Architectural, engineering and related services	6.0	6.1	6.2	6.1	5.3
Computer systems design and related services	13.0	13.2	13.5	12.9	12.1
Management, scientific and technical consulting services	2.2	2.3	2.3	2.2	2.2
Scientific research and development services	40.2	41.9	40.9	42.0	42.0
Health care and social assistance	0.4	0.4	0.5	0.6	0.6
All other services	0.6	0.7	0.6	0.6	0.5

Table 14-4

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Total all industries		21,992
Agriculture, forestry, fishing and hunting		752
Agriculture		670
Soybean farming	111110	3
Oilseed (except soybean) farming	111120	7
Dry pea and bean farming	111130	1
Wheat farming	111140	2
Corn farming	111150	14
Rice farming	111160	0
Other grain farming	111190	18
Potato farming	111211	39
Other vegetable (except potato) and melon farming	111219	55
Orange groves	111310	0
Citrus (except orange) groves	111320	0
Non-citrus fruit and tree nut farming	111330	84
Mushroom production	111411	18
Other food crops grown under cover	111419	52
Nursery and tree production	111421	50
Floriculture production	111422	70
Tobacco farming	111910	1
Cotton farming	111920	0
Sugar cane farming	111930	0
Hay farming	111940	5
Fruit and vegetable combination farming	111993	14
Maple syrup and products production	111994	5
All other miscellaneous crop farming	111999	23
Beef cattle ranching and farming, including feedlots	112110	17
Dairy cattle and milk production	112120	57
Hog and pig farming	112210	31
Chicken egg production	112310	6
Broiler and other meat-type chicken production	112320	9
Turkey production	112330	1
Poultry hatcheries	112340	5
Combination poultry and egg production	112391	0
All other poultry production	112399	6
Sheep farming	112410	2
Goat farming	112420	3
Apiculture	112910	11
Horse and other equine production	112920	0
Fur-bearing animal and rabbit production	112930	7
Animal combination farming	112991	6
All other miscellaneous animal production	112999	2
Support activities for crop production	115110	33
Support activities for animal production	115210	13
Forestry, logging and support activities for forestry		36
Timber tract operations	113110	1
Forest nurseries and gathering of forest products	113210	1
Logging (except contract)	113311	7
Contract logging	113312	9
Support activities for forestry	115310	18
Fishing, hunting, trapping and animal aquaculture		46
Aquaculture	112510	40
Salt water fishing	114113	5
Freshwater fishing	114114	1
Hunting and trapping	114210	0
Mining, quarrying, and oil and gas extraction		229
Oil and gas extraction, contract drilling and related services		140
Conventional oil and gas extraction	211113	40
Non-conventional oil extraction	211114	18
Oil and gas contract drilling	213111	10
Services to oil and gas extraction	213118	72
Mining and quarrying, contract drilling and related support activities		89
Bituminous coal mining	212114	1
Subbituminous coal mining	212115	1
Lignite coal mining	212116	0

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Iron ore mining	212210	3
Gold and silver ore mining	212220	6
Lead-zinc ore mining	212231	0
Nickel-copper ore mining	212232	1
Copper-zinc ore mining	212233	7
Uranium ore mining	212291	1
All other metal ore mining	212299	2
Granite mining and quarrying	212314	2
Limestone mining and quarrying	212315	3
Marble mining and quarrying	212316	0
Sandstone mining and quarrying	212317	1
Sand and gravel mining and quarrying	212323	12
Shale, clay and refractory mineral mining and quarrying	212326	1
Diamond mining	212392	2
Salt mining	212393	2
Asbestos mining	212394	0
Gypsum mining	212395	0
Potash mining	212396	2
Peat extraction	212397	4
All other non-metallic mineral mining and quarrying	212398	2
Contract drilling (except oil and gas)	213117	8
Other support activities for mining	213119	28
Utilities		147
Electric power generation, transmission and distribution		34
Hydro-electric power generation	221111	7
Fossil-fuel electric power generation	221112	8
Nuclear electric power generation	221113	0
Other electric power generation	221119	16
Electric bulk power transmission and control	221121	1
Electric power distribution	221122	2
Other utilities		113
Natural gas distribution	221210	5
Water supply and irrigation systems	221310	15
Sewage treatment facilities	221320	0
Steam and air-conditioning supply	221330	1
Waste collection	562110	14
Waste treatment and disposal	562210	34
Remediation services	562910	22
Material recovery facilities	562920	13
All other waste management services	562990	9
Construction		694
Residential building construction	236110	59
Industrial building and structure construction	236210	11
Commercial and institutional building construction	236220	29
Water and sewer line and related structures construction	237110	25
Oil and gas pipeline and related structures construction	237120	12
Power and communication line and related structures construction	237130	17
Land subdivision	237210	9
Highway, street and bridge construction	237310	46
Other heavy and civil engineering construction	237990	13
Poured concrete foundation and structure contractors	238110	15
Structural steel and precast concrete contractors	238120	12
Framing contractors	238130	3
Masonry contractors	238140	7
Glass and glazing contractors	238150	13
Roofing contractors	238160	14
Siding contractors	238170	5
Other foundation, structure and building exterior contractors	238190	18
Electrical contractors and other wiring installation contractors	238210	100
Plumbing, heating and air-conditioning contractors	238220	94
Elevator and escalator installation contractors	238291	5
All other building equipment contractors	238299	32
Drywall and insulation contractors	238310	8
Painting and wall covering contractors	238320	21
Flooring contractors	238330	11
Tile and terrazzo contractors	238340	7
Finish carpentry contractors	238350	29
Other building finishing contractors	238390	13
Site preparation contractors	238910	35

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^p

	NAICS Code	Performers number
All other specialty trade contractors	238990	31
Manufacturing		8,163
Food manufacturing		570
Dog and cat food manufacturing	311111	10
Other animal food manufacturing	311119	38
Flour milling	311211	5
Rice milling and malt manufacturing	311214	3
Wet corn milling	311221	0
Oilseed processing	311224	4
Fat and oil refining and blending	311225	1
Breakfast cereal manufacturing	311230	3
Sugar manufacturing	311310	0
Non-chocolate confectionery manufacturing	311351	2
Chocolate and chocolate confectionery manufacturing from cacao beans	311352	16
Confectionery manufacturing from purchased chocolate	311340	11
Frozen food manufacturing	311410	29
Fruit and vegetable canning, pickling and drying	311420	43
Fluid milk manufacturing	311511	10
Butter, cheese, and dry and condensed dairy product manufacturing	311515	32
Ice cream and frozen dessert manufacturing	311520	5
Animal (except poultry) slaughtering	311611	13
Rendering and meat processing from carcasses	311614	36
Poultry processing	311615	20
Seafood product preparation and packaging	311710	31
Retail bakeries	311811	31
Commercial bakeries and frozen bakery product manufacturing	311814	89
Cookie and cracker manufacturing	311821	15
Flour mixes, dough, and pasta manufacturing from purchased flour	311824	10
Tortilla manufacturing	311830	0
Roasted nut and peanut butter manufacturing	311911	1
Other snack food manufacturing	311919	4
Coffee and tea manufacturing	311920	9
Flavouring syrup and concentrate manufacturing	311930	8
Seasoning and dressing manufacturing	311940	22
All other food manufacturing	311990	69
Beverage and tobacco product manufacturing		80
Soft drink and ice manufacturing	312110	8
Breweries	312120	34
Wineries	312130	31
Distilleries	312140	6
Tobacco stemming and redrying	312210	0
Tobacco product manufacturing	312220	1
Textile mills and textile product mills		133
Fibre, yarn and thread mills	313110	4
Broad-woven fabric mills	313210	17
Narrow fabric mills and Schiffli machine embroidery	313220	9
Nonwoven fabric mills	313230	9
Knit fabric mills	313240	14
Textile and fabric finishing	313310	18
Fabric coating	313320	4
Carpet and rug mills	314110	4
Curtain and linen mills	314120	9
Textile bag and canvas mills	314910	24
All other textile product mills	314990	21
Wood product manufacturing		243
Sawmills (except shingle and shake mills)	321111	32
Shingle and shake mills	321112	8
Wood preservation	321114	4
Hardwood veneer and plywood mills	321211	11
Softwood veneer and plywood mills	321212	4
Structural wood product manufacturing	321215	12
Particle board and fibreboard mills	321216	9
Waferboard mills	321217	4
Wood window and door manufacturing	321911	36
Other millwork	321919	57
Wood container and pallet manufacturing	321920	14
Manufactured (mobile) home manufacturing	321991	3

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Prefabricated wood building manufacturing	321992	14
All other miscellaneous wood product manufacturing	321999	35
Paper manufacturing		129
Mechanical pulp mills	322111	1
Chemical pulp mills	322112	5
Paper (except newsprint) mills	322121	11
Newsprint mills	322122	5
Paperboard mills	322130	9
Corrugated and solid fibre box manufacturing	322211	20
Folding paperboard box manufacturing	322212	14
Other paperboard container manufacturing	322219	9
Paper bag and coated and treated paper manufacturing	322220	28
Stationery product manufacturing	322230	11
Sanitary paper product manufacturing	322291	3
All other converted paper product manufacturing	322299	13
Printing and related support activities		314
Commercial screen printing	323113	38
Quick printing	323114	10
Digital printing	323115	26
Manifold business forms printing	323116	19
Other printing	323119	186
Support activities for printing	323120	35
Petroleum and coal products manufacturing		33
Petroleum refineries	324110	3
Asphalt paving mixture and block manufacturing	324121	9
Asphalt shingle and coating material manufacturing	324122	3
Other petroleum and coal product manufacturing	324190	18
Pharmaceutical and medicine manufacturing		122
Pharmaceutical and medicine manufacturing	325410	122
Other chemicals manufacturing		469
Petrochemical manufacturing	325110	4
Industrial gas manufacturing	325120	7
Synthetic dye and pigment manufacturing	325130	10
Alkali and chlorine manufacturing	325181	0
All other basic inorganic chemical manufacturing	325189	17
Other basic organic chemical manufacturing	325190	27
Resin and synthetic rubber manufacturing	325210	30
Artificial and synthetic fibres and filaments manufacturing	325220	2
Chemical fertilizer (except potash) manufacturing	325313	11
Mixed fertilizer manufacturing	325314	12
Pesticide and other agricultural chemical manufacturing	325320	10
Paint and coating manufacturing	325510	62
Adhesive manufacturing	325520	25
Soap and cleaning compound manufacturing	325610	60
Toilet preparation manufacturing	325620	67
Printing ink manufacturing	325910	14
Explosives manufacturing	325920	3
Custom compounding of purchased resins	325991	12
All other miscellaneous chemical product manufacturing	325999	96
Plastic product manufacturing		475
Plastic bag and pouch manufacturing	326111	24
Plastic film and sheet manufacturing	326114	31
Unlaminated plastic profile shape manufacturing	326121	28
Plastic pipe and pipe fitting manufacturing	326122	18
Laminated plastic plate, sheet (except packaging), and shape manufacturing	326130	10
Polystyrene foam product manufacturing	326140	20
Urethane and other foam product (except polystyrene) manufacturing	326150	18
Plastic bottle manufacturing	326160	17
Plastic plumbing fixture manufacturing	326191	17
Motor vehicle plastic parts manufacturing	326193	45
Plastic window and door manufacturing	326196	32
All other plastic product manufacturing	326198	215
Rubber product manufacturing		63
Tire manufacturing	326210	3
Rubber and plastic hose and belting manufacturing	326220	11
Other rubber product manufacturing	326290	49

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Non-metallic mineral product manufacturing		202
Pottery, ceramics and plumbing fixture manufacturing	327110	4
Clay building material and refractory manufacturing	327120	13
Glass manufacturing	327214	13
Glass product manufacturing from purchased glass	327215	24
Cement manufacturing	327310	1
Ready-mix concrete manufacturing	327320	26
Concrete pipe, brick and block manufacturing	327330	32
Other concrete product manufacturing	327390	29
Lime manufacturing	327410	3
Gypsum product manufacturing	327420	6
Abrasive product manufacturing	327910	7
All other non-metallic mineral product manufacturing	327990	44
Primary metal (ferrous) manufacturing		69
Iron and steel mills and ferro-alloy manufacturing	331110	10
Iron and steel pipes and tubes manufacturing from purchased steel	331210	20
Cold-rolled steel shape manufacturing	331221	7
Steel wire drawing	331222	2
Iron foundries	331511	15
Steel foundries	331514	15
Primary metal (non-ferrous) manufacturing		73
Primary production of alumina and aluminum	331313	3
Aluminum rolling, drawing, extruding and alloying	331317	12
Non-ferrous metal (except aluminum) smelting and refining	331410	8
Copper rolling, drawing, extruding and alloying	331420	6
Non-ferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying	331490	8
Non-ferrous die-casting foundries	331523	14
Non-ferrous foundries (except die-casting)	331529	22
Fabricated metal product manufacturing		1,154
Forging	332113	19
Stamping	332118	49
Cutlery and hand tool manufacturing	332210	31
Prefabricated metal building and component manufacturing	332311	23
Concrete reinforcing bar manufacturing	332314	2
Other plate work and fabricated structural product manufacturing	332319	71
Metal window and door manufacturing	332321	64
Other ornamental and architectural metal product manufacturing	332329	84
Power boiler and heat exchanger manufacturing	332410	14
Metal tank (heavy gauge) manufacturing	332420	35
Metal can manufacturing	332431	1
Other metal container manufacturing	332439	21
Hardware manufacturing	332510	20
Spring (heavy gauge) manufacturing	332611	1
Other fabricated wire product manufacturing	332619	24
Machine shops	332710	412
Turned product and screw, nut and bolt manufacturing	332720	27
Coating, engraving, cold and heat treating and allied activities	332810	102
Metal valve manufacturing	332910	21
Ball and roller bearing manufacturing	332991	8
All other miscellaneous fabricated metal product manufacturing	332999	125
Machinery manufacturing		1,389
Agricultural implement manufacturing	333110	119
Construction machinery manufacturing	333120	47
Mining and oil and gas field machinery manufacturing	333130	88
Sawmill and woodworking machinery manufacturing	333245	21
Rubber and plastics industry machinery manufacturing	333246	36
Paper industry machinery manufacturing	333247	8
All other industrial machinery manufacturing	333248	126
Commercial and service industry machinery manufacturing	333310	129
Industrial and commercial fan and blower and air purification equipment manufacturing	333413	40
Heating equipment and commercial refrigeration equipment manufacturing	333416	99
Industrial mould manufacturing	333511	104
Other metalworking machinery manufacturing	333519	221
Turbine and turbine generator set unit manufacturing	333611	17
Other engine and power transmission equipment manufacturing	333619	25
Pump and compressor manufacturing	333910	32

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers
		number
Material handling equipment manufacturing	333920	109
All other general-purpose machinery manufacturing	333990	168
Computer and peripheral equipment manufacturing		90
Computer and peripheral equipment manufacturing	334110	90
Communications equipment manufacturing		134
Telephone apparatus manufacturing	334210	22
Radio and television broadcasting and wireless communications equipment manufacturing	334220	66
Other communications equipment manufacturing	334290	46
Semiconductor and other electronic component manufacturing		170
Semiconductor and other electronic component manufacturing	334410	170
Navigational, measuring, medical and control instrument manufacturing		333
Navigational and guidance instruments manufacturing	334511	43
Measuring, medical and controlling devices manufacturing	334512	290
Other computer and electronic products manufacturing		65
Audio and video equipment manufacturing	334310	42
Manufacturing and reproducing magnetic and optical media	334610	23
Electrical equipment, appliance and component manufacturing		310
Electric lamp bulb and parts manufacturing	335110	4
Lighting fixture manufacturing	335120	47
Small electrical appliance manufacturing	335210	20
Major kitchen appliance manufacturing	335223	7
Other major appliance manufacturing	335229	9
Power, distribution and specialty transformers manufacturing	335311	28
Motor and generator manufacturing	335312	16
Switchgear and switchboard, and relay and industrial control apparatus manufacturing	335315	73
Battery manufacturing	335910	5
Communication and energy wire and cable manufacturing	335920	20
Wiring device manufacturing	335930	16
All other electrical equipment and component manufacturing	335990	65
Motor vehicle and parts manufacturing		273
Automobile and light-duty motor vehicle manufacturing	336110	11
Heavy-duty truck manufacturing	336120	12
Motor vehicle body manufacturing	336211	37
Truck trailer manufacturing	336212	31
Motor home, travel trailer and camper manufacturing	336215	4
Motor vehicle gasoline engine and engine parts manufacturing	336310	17
Motor vehicle electrical and electronic equipment manufacturing	336320	24
Motor vehicle steering and suspension components (except spring) manufacturing	336330	5
Motor vehicle brake system manufacturing	336340	5
Motor vehicle transmission and power train parts manufacturing	336350	16
Motor vehicle seating and interior trim manufacturing	336360	11
Motor vehicle metal stamping	336370	37
Other motor vehicle parts manufacturing	336390	63
Aerospace products and parts manufacturing		83
Aerospace product and parts manufacturing	336410	83
All other transportation equipment manufacturing		91
Railroad rolling stock manufacturing	336510	11
Ship building and repairing	336611	8
Boat building	336612	31
Other transportation equipment manufacturing	336990	41
Furniture and related product manufacturing		266
Wood kitchen cabinet and counter top manufacturing	337110	49
Upholstered household furniture manufacturing	337121	22
Other wood household furniture manufacturing	337123	45
Household furniture (except wood and upholstered) manufacturing	337126	14
Institutional furniture manufacturing	337127	24
Wood office furniture, including custom architectural woodwork, manufacturing	337213	22
Office furniture (except wood) manufacturing	337214	20
Showcase, partition, shelving and locker manufacturing	337215	55
Mattress manufacturing	337910	9
Blind and shade manufacturing	337920	6
Other manufacturing industries		830
Hosiery and sock mills	315110	5

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Other clothing knitting mills	315190	14
Cut and sew clothing contracting	315210	26
Men's and boys' cut and sew clothing manufacturing	315220	14
Infants' cut and sew clothing manufacturing	315241	1
Women's and girls' cut and sew clothing manufacturing	315249	49
Fur and leather clothing manufacturing	315281	12
All other cut and sew clothing manufacturing	315289	14
Clothing accessories and other clothing manufacturing	315990	19
Leather and hide tanning and finishing	316110	6
Footwear manufacturing	316210	14
Other leather and allied product manufacturing	316990	9
Medical equipment and supplies manufacturing	339110	199
Jewellery and silverware manufacturing	339910	18
Sporting and athletic goods manufacturing	339920	67
Doll, toy and game manufacturing	339930	22
Office supplies (except paper) manufacturing	339940	11
Sign manufacturing	339950	43
All other miscellaneous manufacturing	339990	287
Services		12,007
Wholesale trade		1,865
Live animal merchant wholesalers	411110	4
Oilseed and grain merchant wholesalers	411120	11
Nursery stock and plant merchant wholesalers	411130	17
Other farm product merchant wholesalers	411190	5
Petroleum and petroleum products merchant wholesalers	412110	5
General-line food merchant wholesalers	413110	24
Dairy and milk products merchant wholesalers	413120	5
Poultry and egg merchant wholesalers	413130	8
Fish and seafood product merchant wholesalers	413140	14
Fresh fruit and vegetable merchant wholesalers	413150	27
Red meat and meat product merchant wholesalers	413160	16
Other specialty-line food merchant wholesalers	413190	104
Non-alcoholic beverage merchant wholesalers	413210	4
Alcoholic beverage merchant wholesalers	413220	3
Cigarette and tobacco product merchant wholesalers	413310	1
Clothing and clothing accessories merchant wholesalers	414110	76
Footwear merchant wholesalers	414120	3
Piece goods, notions and other dry goods merchant wholesalers	414130	26
Home entertainment equipment merchant wholesalers	414210	5
Household appliance merchant wholesalers	414220	8
China, glassware, crockery and pottery merchant wholesalers	414310	2
Floor covering merchant wholesalers	414320	6
Linen, drapery and other textile furnishings merchant wholesalers	414330	7
Other home furnishings merchant wholesalers	414390	18
Jewellery and watch merchant wholesalers	414410	3
Book, periodical and newspaper merchant wholesalers	414420	3
Photographic equipment and supplies merchant wholesalers	414430	3
Sound recording merchant wholesalers	414440	0
Video recording merchant wholesalers	414450	0
Toy and hobby goods merchant wholesalers	414460	7
Amusement and sporting goods merchant wholesalers	414470	24
Pharmaceuticals and pharmacy supplies merchant wholesalers	414510	56
Toiletries, cosmetics and sundries merchant wholesalers	414520	37
New and used automobile and light-duty truck merchant wholesalers	415110	0
Truck, tractor and bus merchant wholesalers	415120	2
Recreational and other motor vehicles merchant wholesalers	415190	2

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Tire merchant wholesalers	415210	1
Other new motor vehicle parts and accessories merchant wholesalers	415290	41
Used motor vehicle parts and accessories merchant wholesalers	415310	1
Electrical wiring and construction supplies merchant wholesalers	416110	60
Plumbing, heating and air-conditioning equipment and supplies merchant wholesalers	416120	55
Metal service centres	416210	32
General-line building supplies merchant wholesalers	416310	10
Lumber, plywood and millwork merchant wholesalers	416320	26
Hardware merchant wholesalers	416330	25
Paint, glass and wallpaper merchant wholesalers	416340	8
Other specialty-line building supplies merchant wholesalers	416390	31
Farm, lawn and garden machinery and equipment merchant wholesalers	417110	33
Construction and forestry machinery, equipment and supplies merchant wholesalers	417210	13
Mining and oil and gas well machinery, equipment and supplies merchant wholesalers	417220	26
Industrial machinery, equipment and supplies merchant wholesalers	417230	186
Computer, computer peripheral and pre-packaged software merchant wholesalers	417310	126
Electronic components, navigational and communications equipment and supplies merchant wholesalers	417320	106
Office and store machinery and equipment merchant wholesalers	417910	22
Service establishment machinery, equipment and supplies merchant wholesalers	417920	19
Professional machinery, equipment and supplies merchant wholesalers	417930	115
All other machinery, equipment and supplies merchant wholesalers	417990	46
Recyclable metal merchant wholesalers	418110	11
Recyclable paper and paperboard merchant wholesalers	418120	0
Other recyclable material merchant wholesalers	418190	29
Stationery and office supplies merchant wholesalers	418210	8
Other paper and disposable plastic product merchant wholesalers	418220	18
Agricultural feed merchant wholesalers	418310	13
Seed merchant wholesalers	418320	8
Agricultural chemical and other farm supplies merchant wholesalers	418390	19
Chemical (except agricultural) and allied product merchant wholesalers	418410	62
Log and wood chip merchant wholesalers	418910	2
Mineral, ore and precious metal merchant wholesalers	418920	0
Second-hand goods (except machinery and automotive) merchant wholesalers	418930	2
All other merchant wholesalers	418990	89
Business-to-business electronic markets	419110	4
Wholesale trade agents and brokers	419120	82
Retail trade		534
New car dealers	441110	0
Used car dealers	441120	5
Recreational vehicle dealers	441210	3
Motorcycle, boat and other motor vehicle dealers	441220	17
Automotive parts and accessories stores	441310	17
Tire dealers	441320	0
Furniture stores	442110	8
Floor covering stores	442210	3
Window treatment stores	442291	1
Print and picture frame stores	442292	2
All other home furnishings stores	442298	4
Appliance, television and other electronics stores	443143	22
Computer and software stores	443144	73

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^p

	NAICS Code	Performers number
Camera and photographic supplies stores	443145	3
Audio and video recordings stores	443146	2
Home centres	444110	5
Paint and wallpaper stores	444120	7
Hardware stores	444130	3
Other building material dealers	444190	29
Outdoor power equipment stores	444210	1
Nursery stores and garden centres	444220	13
Supermarkets and other grocery (except convenience) stores	445110	8
Convenience stores	445120	0
Meat markets	445210	19
Fish and seafood markets	445220	2
Fruit and vegetable markets	445230	3
Baked goods stores	445291	34
Confectionery and nut stores	445292	2
All other specialty food stores	445299	11
Beer, wine and liquor stores	445310	2
Pharmacies and drug stores	446110	11
Cosmetics, beauty supplies and perfume stores	446120	8
Optical goods stores	446130	3
Food (health) supplement stores	446191	7
All other health and personal care stores	446199	19
Gasoline stations with convenience stores	447110	0
Other gasoline stations	447190	2
Men's clothing stores	448110	2
Women's clothing stores	448120	7
Children's and infants' clothing stores	448130	1
Family clothing stores	448140	10
Clothing accessories stores	448150	2
Fur stores	448191	0
All other clothing stores	448199	10
Shoe stores	448210	3
Jewellery stores	448310	5
Luggage and leather goods stores	448320	2
Golf equipment and supplies specialty stores	451111	1
Ski equipment and supplies specialty stores	451112	0
Cycling equipment and supplies specialty stores	451113	2
All other sporting goods stores	451119	8
Hobby, toy and game stores	451120	1
Sewing, needlework and piece goods stores	451130	3
Musical instrument and supplies stores	451140	3
Book stores and news dealers	451310	3
Department stores	452110	2
Warehouse clubs	452910	0
Home and auto supplies stores	452991	0
All other miscellaneous general merchandise stores	452999	9
Florists	453110	1
Office supplies and stationery stores	453210	2
Gift, novelty and souvenir stores	453220	6
Used merchandise stores	453310	1
Pet and pet supplies stores	453910	8
Art dealers	453920	1
Mobile home dealers	453930	0
Beer and wine-making supplies stores	453992	4
All other miscellaneous store retailers (except beer and wine-making supplies stores)	453999	26
Electronic shopping and mail-order houses	454110	52
Vending machine operators	454210	0
Heating oil dealers	454311	1
Liquefied petroleum gas (bottled gas) dealers	454312	1
Other fuel dealers	454319	1
Other direct selling establishments	454390	7
Transportation and warehousing		178
Scheduled air transportation	481110	1
Non-scheduled chartered air transportation	481214	4
Non-scheduled specialty flying services	481215	7
Short-haul freight rail transportation	482112	0
Mainline freight rail transportation	482113	3

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers
		number
Passenger rail transportation	482114	0
Deep sea, coastal and Great Lakes water transportation (except by ferries)	483115	2
Deep sea, coastal and Great Lakes water transportation by ferries	483116	0
Inland water transportation (except by ferries)	483213	1
Inland water transportation by ferries	483214	0
General freight trucking, local	484110	6
General freight trucking, long distance, truck-load	484121	16
General freight trucking, long distance, less than truck-load	484122	3
Used household and office goods moving	484210	0
Bulk liquids trucking, local	484221	1
Dry bulk materials trucking, local	484222	5
Forest products trucking, local	484223	1
Other specialized freight (except used goods) trucking, local	484229	0
Bulk liquids trucking, long distance	484231	2
Dry bulk materials trucking, long distance	484232	3
Forest products trucking, long distance	484233	1
Other specialized freight (except used goods) trucking, long distance	484239	7
Urban transit systems	485110	1
Interurban and rural bus transportation	485210	0
Taxi service	485310	0
Limousine service	485320	1
School and employee bus transportation	485410	6
Charter bus industry	485510	2
Other transit and ground passenger transportation	485990	2
Pipeline transportation of crude oil	486110	2
Pipeline transportation of natural gas	486210	2
Pipeline transportation of refined petroleum products	486910	0
All other pipeline transportation	486990	0
Scenic and sightseeing transportation, land	487110	0
Scenic and sightseeing transportation, water	487210	0
Scenic and sightseeing transportation, other	487990	1
Air traffic control	488111	1
Other airport operations	488119	2
Other support activities for air transportation	488190	19
Support activities for rail transportation	488210	5
Port and harbour operations	488310	2
Marine cargo handling	488320	0
Marine salvage services	488331	0
Ship piloting services	488332	0
Other navigational services to shipping	488339	2
Other support activities for water transportation	488390	3
Motor vehicle towing	488410	0
Other support activities for road transportation	488490	9
Marine shipping agencies	488511	0
Other freight transportation arrangement	488519	19
Other support activities for transportation	488990	5
Postal service	491110	2
Couriers	492110	4
Local messengers and local delivery	492210	0
General warehousing and storage	493110	12
Refrigerated warehousing and storage	493120	6
Farm product warehousing and storage	493130	3
Other warehousing and storage	493190	4
Information and cultural industries		1,314
Newspaper publishers	511110	6
Periodical publishers	511120	13
Book publishers	511130	10
Directory and mailing list publishers	511140	9
Other publishers	511190	3
Software publishers (except video game publishers)	511211	677
Video game publishers	511212	24
Motion picture and video production	512110	51
Motion picture and video distribution	512120	3
Motion picture and video exhibition	512130	1
Post-production and other motion picture and video industries	512190	34
Record production	512210	1
Integrated record production/distribution	512220	0
Music publishers	512230	2
Sound recording studios	512240	4
Other sound recording industries	512290	0

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Radio broadcasting	515110	1
Television broadcasting	515120	1
Pay and specialty television	515210	1
Wired telecommunications carriers (except cable)	517111	26
Cable and other program distribution	517112	8
Wireless telecommunications carriers (except satellite)	517210	23
Satellite telecommunications	517410	10
Other telecommunications	517910	78
Data processing, hosting, and related services	518210	156
News syndicates	519110	9
Libraries	519121	0
Archives	519122	0
Internet publishing and broadcasting and web search portals	519130	154
All other information services	519190	9
Finance, insurance and real estate		368
Monetary authorities - central bank	521110	0
Personal and commercial banking industry	522111	8
Corporate and institutional banking industry	522112	0
Local credit unions	522130	10
Other depository credit intermediation	522190	0
Credit card issuing	522210	0
Sales financing	522220	2
Consumer lending	522291	5
All other non-depository credit intermediation	522299	6
Mortgage and non-mortgage loan brokers	522310	5
Central credit unions	522321	1
Other financial transactions processing and clearing house activities	522329	13
Other activities related to credit intermediation	522390	2
Investment banking and securities dealing	523110	5
Securities brokerage	523120	5
Commodity contracts dealing	523130	3
Commodity contracts brokerage	523140	1
Securities and commodity exchanges	523210	3
Miscellaneous intermediation	523910	41
Portfolio management	523920	33
Investment advice	523930	13
All other financial investment activities	523990	11
Direct individual life, health and medical insurance carriers	524111	4
Direct group life, health and medical insurance carriers	524112	4
Direct general property and casualty insurance carriers	524121	8
Direct, private, automobile insurance carriers	524122	0
Direct, public, automobile insurance carriers	524123	0
Direct property insurance carriers	524124	0
Direct liability insurance carriers	524125	0
Other direct insurance (except life, health and medical) carriers	524129	1
Life reinsurance carriers	524131	0
Accident and sickness reinsurance carriers	524132	0
Automobile reinsurance carriers	524133	0
Property reinsurance carriers	524134	1
Liability reinsurance carriers	524135	0
General and other reinsurance carriers	524139	0
Insurance agencies and brokerages	524210	19
Claims adjusters	524291	1
All other insurance related activities	524299	6
Trusteed pension funds	526111	0
Non-trusteed pension funds	526112	0
Equity funds - Canadian	526911	0
Equity funds - foreign	526912	0
Mortgage funds	526913	0
Money market funds	526914	0
Bond and income / dividend funds - Canadian	526915	0
Bond and income / dividend funds - foreign	526916	0
Balanced funds / asset allocation funds	526917	0
Other open-ended funds	526919	0
Segregated (except pension) funds	526930	0
Securitization vehicles	526981	0
All other miscellaneous funds and financial vehicles	526989	2
Lessors of residential buildings and dwellings (except social housing projects)	531111	7
Lessors of social housing projects	531112	0
Lessors of non-residential buildings (except mini-warehouses)	531120	18

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers number
Self-storage mini-warehouses	531130	0
Lessors of other real estate property	531190	3
Real estate agents	531211	0
Offices of real estate brokers	531212	4
Real estate property managers	531310	14
Offices of real estate appraisers	531320	3
Other activities related to real estate	531390	7
Passenger car rental	532111	2
Passenger car leasing	532112	0
Truck, utility trailer and RV (recreational vehicle) rental and leasing	532120	1
Consumer electronics and appliance rental	532210	1
Formal wear and costume rental	532220	0
Video tape and disc rental	532230	3
Other consumer goods rental	532290	7
General rental centres	532310	1
Construction, transportation, mining, and forestry machinery and equipment rental and leasing	532410	39
Office machinery and equipment rental and leasing	532420	2
Other commercial and industrial machinery and equipment rental and leasing	532490	19
Lessors of non-financial intangible assets (except copyrighted works)	533110	24
Architectural, engineering and related services		968
Architectural services	541310	22
Landscape architectural services	541320	3
Engineering services	541330	735
Drafting services	541340	11
Building inspection services	541350	10
Geophysical surveying and mapping services	541360	26
Surveying and mapping (except geophysical) services	541370	34
Testing laboratories	541380	127
Computer systems design and related services		2,982
Computer systems design and related services (except video game design and development)	541514	2909
Video game design and development services	541515	73
Management, scientific and technical consulting services		570
Administrative management and general management consulting services	541611	160
Human resources consulting services	541612	10
Other management consulting services	541619	109
Environmental consulting services	541620	100
Other scientific and technical consulting services	541690	191
Scientific research and development services		998
Scientific research and development services	5417	998
Health care and social assistance		520
Offices of physicians	621110	310
Offices of dentists	621210	55
Offices of chiropractors	621310	3
Offices of optometrists	621320	6
Offices of mental health practitioners (except physicians)	621330	4
Offices of physical, occupational, and speech therapists and audiologists	621340	14
Offices of all other health practitioners	621390	17
Family planning centres	621410	7
Out-patient mental health and substance abuse centres	621420	3
Community health centres	621494	4
All other out-patient care centres	621499	4
Medical and diagnostic laboratories	621510	75
Home health care services	621610	4
Ambulance (except air ambulance) services	621911	1
Air ambulance services	621912	0
All other ambulatory health care services	621990	1
General (except paediatric) hospitals	622111	1
Paediatric hospitals	622112	0
Psychiatric and substance abuse hospitals	622210	0
Specialty (except psychiatric and substance abuse) hospitals	622310	1
Nursing care facilities	623110	0
Residential developmental handicap facilities	623210	0
Residential substance abuse facilities	623221	0
Homes for the psychiatrically disabled	623222	0
Community care facilities for the elderly	623310	1
Transition homes for women	623991	0
Homes for emotionally disturbed children	623992	0
Homes for the physically handicapped or disabled	623993	0
All other residential care facilities	623999	0

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^p

	NAICS Code	Performers number
Child and youth services	624110	0
Services for the elderly and persons with disabilities	624120	3
Other individual and family services	624190	4
Community food services	624210	0
Community housing services	624220	0
Emergency and other relief services	624230	0
Vocational rehabilitation services	624310	2
Child day-care services	624410	0
All other services		1,710
Offices of lawyers	541110	2
Offices of notaries	541120	0
Other legal services	541190	7
Offices of accountants	541212	13
Tax preparation services	541213	2
Bookkeeping, payroll and related services	541215	24
Interior design services	541410	4
Industrial design services	541420	64
Graphic design services	541430	57
Other specialized design services	541490	13
Advertising agencies	541810	89
Public relations services	541820	4
Media buying agencies	541830	2
Media representatives	541840	9
Display advertising	541850	15
Direct mail advertising	541860	5
Advertising material distribution services	541870	4
Specialty advertising distributors	541891	9
All other services related to advertising	541899	16
Marketing research and public opinion polling	541910	36
Photographic services	541920	12
Translation and interpretation services	541930	5
Veterinary services	541940	16
All other professional, scientific and technical services	541990	103
Holding companies	551113	188
Head offices	551114	4
Office administrative services	561110	105
Facilities support services	561210	2
Employment placement agencies and executive search services	561310	16
Temporary help services	561320	12
Professional employer organizations	561330	1
Document preparation services	561410	5
Telephone call centres	561420	14
Business service centres	561430	12
Collection agencies	561440	2
Credit bureaus	561450	1
Other business support services	561490	9
Travel agencies	561510	5
Tour operators	561520	5
Other travel arrangement and reservation services	561590	6
Investigation services	561611	3
Security guard and patrol services	561612	5
Armoured car services	561613	0
Security systems services (except locksmiths)	561621	35
Locksmiths	561622	1
Exterminating and pest control services	561710	4
Window cleaning services	561721	0
Janitorial services (except window cleaning)	561722	9
Landscaping services	561730	24
Carpet and upholstery cleaning services	561740	0
Duct and chimney cleaning services	561791	3
All other services to buildings and dwellings	561799	4
Packaging and labelling services	561910	23
Convention and trade show organizers	561920	11
All other support services	561990	68
Elementary and secondary schools	611110	1
Community colleges and C.E.G.E.P.s	611210	4
Business and secretarial schools	611410	1
Computer training	611420	12
Professional and management development training	611430	14
Technical and trade schools	611510	7

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^a

	NAICS Code	Performers
		number
Fine arts schools	611610	0
Athletic instruction	611620	1
Language schools	611630	1
All other schools and instruction	611690	16
Educational support services	611710	11
Theatre (except musical) companies	711111	0
Musical theatre and opera companies	711112	0
Dance companies	711120	1
Musical groups and artists	711130	0
Other performing arts companies	711190	3
Sports teams and clubs	711211	0
Horse race tracks	711213	0
Other spectator sports	711218	2
Live theatres and other performing arts presenters with facilities	711311	0
Sports stadiums and other presenters with facilities	711319	0
Performing arts promoters (presenters) without facilities	711321	3
Festivals without facilities	711322	0
Sports presenters and other presenters without facilities	711329	2
Agents and managers for artists, athletes, entertainers and other public figures	711410	0
Independent visual artists and artisans	711511	5
Independent actors, comedians and performers	711512	2
Independent writers and authors	711513	1
Non-commercial art museums and galleries	712111	1
History and science museums	712115	0
Other museums	712119	0
Historic and heritage sites	712120	0
Zoos and botanical gardens	712130	1
Nature parks and other similar institutions	712190	1
Amusement and theme parks	713110	0
Amusement arcades	713120	1
Casinos (except casino hotels)	713210	0
Lotteries	713291	1
All other gambling industries	713299	4
Golf courses and country clubs	713910	2
Skiing facilities	713920	1
Marinas	713930	1
Fitness and recreational sports centres	713940	4
Bowling centres	713950	0
All other amusement and recreation industries	713990	9
Hotels	721111	1
Motor hotels	721112	0
Resorts	721113	0
Motels	721114	0
Casino hotels	721120	0
Bed and breakfast	721191	1
Housekeeping cottages and cabins	721192	0
All other traveller accommodation	721198	1
Recreational vehicle (RV) parks and campgrounds	721211	0
Hunting and fishing camps	721212	0
Recreational (except hunting and fishing) and vacation camps	721213	1
Rooming and boarding houses	721310	0
Full-service restaurants	722511	20
Limited-service eating places	722512	23
Food service contractors	722310	2
Caterers	722320	11
Mobile food services	722330	0
Drinking places (alcoholic beverages)	722410	4
General automotive repair	811111	34
Automotive exhaust system repair	811112	1
Other automotive mechanical and electrical repair and maintenance	811119	11
Automotive body, paint and interior repair and maintenance	811121	25
Automotive glass replacement shops	811122	3
Car washes	811192	2
All other automotive repair and maintenance	811199	2
Electronic and precision equipment repair and maintenance	811210	56
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	811310	209
Home and garden equipment repair and maintenance	811411	6
Appliance repair and maintenance	811412	4
Reupholstery and furniture repair	811420	7
Footwear and leather goods repair	811430	0

Table 14-4 – continued

Research and development performers — By the North American Industry Classification System (NAICS) 2012, in 2012^p

	NAICS Code	Performers number
Other personal and household goods repair and maintenance	811490	19
Barber shops	812114	0
Beauty salons	812115	6
Unisex hair salons	812116	0
Other personal care services	812190	12
Funeral homes	812210	1
Cemeteries and crematoria	812220	0
Coin-operated laundries and dry cleaners	812310	0
Dry cleaning and laundry services (except coin-operated)	812320	2
Linen and uniform supply	812330	2
Pet care (except veterinary) services	812910	2
Photo finishing laboratories (except one-hour)	812921	4
One-hour photo finishing	812922	0
Parking lots and garages	812930	0
All other personal services	812990	15
Religious organizations	813110	0
Grant-making and giving services	813210	3
Social advocacy organizations	813310	2
Civic and social organizations	813410	3
Business associations	813910	9
Professional organizations	813920	4
Labour organizations	813930	1
Political organizations	813940	0
Other membership organizations	813990	0
Private households	814110	0

Note(s): Empty cells under the NAICS column appear where there is a subtotal of the number of industry performers.

Table 15

Business enterprises with one or more employees, by industry, with percentage change from 2008 to 2012 and percentage distribution, 2012^p

	2008	2009	2010	2011	2012 ^p	Change from 2008 to 2012	2012 distribution
	number					percent	
Total all industries	985,283	998,810	999,693	997,622	1,013,618	2.9	100.0
Agriculture, forestry, fishing and hunting	49,270	49,642	49,727	50,620	53,677	8.9	5.3
Agriculture	35,935	36,789	37,339	38,459	41,957	16.8	4.1
Forestry, logging and support activities for forestry	7,881	7,449	7,036	6,867	6,402	-18.8	0.6
Fishing, hunting, trapping and animal aquaculture	5,454	5,404	5,352	5,294	5,318	-2.5	0.5
Mining, quarrying, and oil and gas extraction	8,418	8,671	8,282	7,883	8,279	-1.7	0.8
Oil and gas extraction, contract drilling and related services	6,755	6,879	6,500	5,998	6,187	-8.4	0.6
Mining and quarrying, contract drilling and related support activities	1,663	1,792	1,782	1,885	2,092	25.8	0.2
Utilities	3,220	3,274	3,283	3,389	3,462	7.5	0.3
Electric power generation, transmission and distribution	323	321	306	320	310	-4.0	0.0
Other utilities	2,897	2,953	2,977	3,069	3,152	8.8	0.3
Construction	120,539	123,242	124,773	125,641	128,585	6.7	12.7
Manufacturing	51,483	50,755	49,202	48,235	47,144	-8.4	4.7
Food manufacturing	5,083	4,987	4,856	4,788	4,663	-8.3	0.5
Beverage and tobacco product manufacturing	627	660	652	655	634	1.1	0.1
Textile mills and textile product mills	1,355	1,284	1,217	1,184	1,052	-22.4	0.1
Wood product manufacturing	3,582	3,468	3,376	3,272	3,249	-9.3	0.3
Paper manufacturing	555	545	509	501	489	-11.9	0.0
Printing and related support activities	4,233	4,202	4,062	3,938	3,821	-9.7	0.4
Petroleum and coal products manufacturing	139	129	136	129	139	0.0	0.0
Pharmaceutical and medicine manufacturing	261	266	261	263	257	-1.5	0.0
Other chemicals manufacturing	1,439	1,454	1,447	1,407	1,352	-6.0	0.1
Plastic product manufacturing	1,711	1,724	1,662	1,640	1,631	-4.7	0.2
Rubber product manufacturing	265	266	252	246	242	-8.7	0.0
Non-metallic mineral product manufacturing	1,837	1,818	1,764	1,724	1,683	-8.4	0.2
Primary metal (ferrous) manufacturing	293	319	318	248	263	-10.2	0.0
Primary metal (non-ferrous) manufacturing	265	247	252	257	240	-9.4	0.0
Fabricated metal product manufacturing	7,893	7,824	7,581	7,500	7,426	-5.9	0.7
Machinery manufacturing	4,963	4,853	4,664	4,634	4,619	-6.9	0.5
Computer and peripheral equipment manufacturing	246	244	224	216	225	-8.5	0.0
Communications equipment manufacturing	274	291	278	269	256	-6.6	0.0
Semiconductor and other electronic component manufacturing	396	399	387	384	379	-4.3	0.0
Navigational, measuring, medical and control instrument manufacturing	727	717	689	679	663	-8.8	0.1
Other computer and electronic products manufacturing	179	186	179	175	170	-5.0	0.0
Electrical equipment, appliance and component manufacturing	1,049	1,034	1,015	984	956	-8.9	0.1
Motor vehicle and parts manufacturing	1,263	1,234	1,178	1,132	1,082	-14.3	0.1
Aerospace products and parts manufacturing	223	227	212	214	238	6.7	0.0
All other transportation equipment manufacturing	520	515	491	476	458	-11.9	0.0
Furniture and related product manufacturing	4,289	4,237	4,139	4,106	3,870	-9.8	0.4
Other manufacturing industries	7,816	7,625	7,401	7,214	7,087	-9.3	0.7
Services	752,353	763,226	764,426	761,854	772,471	2.7	76.2
Wholesale trade	50,731	50,449	48,924	48,354	47,329	-6.7	4.7
Retail trade	104,281	102,161	100,942	100,265	101,138	-3.0	10.0
Transportation and warehousing	45,396	46,400	46,054	46,531	47,884	5.5	4.7
Information and cultural industries	10,781	10,934	10,998	11,191	12,017	11.5	1.2
Finance, insurance and real estate	63,200	64,170	66,591	68,216	80,355	27.1	7.9
Architectural, engineering and related services	17,664	17,839	17,479	17,613	18,307	3.6	1.8
Computer systems design and related services	23,154	24,312	24,583	25,292	24,608	6.3	2.4
Management, scientific and technical consulting services	24,471	25,305	25,193	25,306	26,274	7.4	2.6
Scientific research and development services	2,432	2,468	2,447	2,425	2,377	-2.3	0.2
Health care and social assistance	81,599	83,246	85,545	85,756	88,422	8.4	8.7
All other services	328,644	335,942	335,670	330,905	323,760	-1.5	31.9

Source(s): Statistics Canada, Business Register, enterprises with one or more employees, December 2008-2012.

Survey methodology

The 2015 industrial R&D intentions survey

The 2013 Research and Development in Canadian Industry (RDCI) survey collected data for four years to provide estimates of final research and development (R&D) expenditures for 2012, actual R&D expenditures for 2013, planned R&D expenditures for 2014 and R&D spending intentions for 2015. The 2013 RDCI questionnaire was sent in September 2014 and collection scheduled to be closed in January 2015. It was actually closed in February 2015. The RDCI survey mail-out included the supplement survey, Energy Research and Development Expenditures by Area of Technology, 2013.

Population and sample

The survey population comprised:

- all firms that had reported R&D expenditures in 2010, 2011, or 2012 reference year surveys;
- firms with an approved claim for a federal R&D income tax incentive for 2010, 2011, 2012 or 2013;
- firms that were identified by respondents in surveys of government science and technology activities as R&D contractors or grantees for 2013 to 2014;
- firms that were reported by other firms as funding or performing R&D in the prior collection cycle; and
- firms identified as funding or performing R&D in 2013 or 2014 through newspaper, journal articles or publicly available directories.

The population of R&D performers and funders comprising 17,235 enterprises in 2013 was then stratified into a frame composed of 55 industry groups that covered the entire business sector. Industrial non-profit associations and business joint ventures are included in the business enterprise sector. Entities in the household, government, higher education and private non-profit sectors are excluded.

Text table 1
RDCI frame and sample

	Enterprises
Frame	17,235
Available for sampling	10,631
Take none (smallest)	6,604
Available for sampling	10,631
Not selected	8,684
Sample	1,947
Must take	450
Take all (large)	640
Take some (medium)	458
Take some (small)	399

RDCI frame and sample

For reference year 2013, thresholds of R&D spending were applied to reduce the numbers of firms reporting R&D only in prior years, but not the reference year. This was done to reduce the number of respondents surveyed who no longer perform or fund R&D (i.e. out of scope).

Sample for reference year 2013

A sample of 1,947 enterprises, which was converted into 2,008 responding units, was selected from the frame consisting of the following groups:

1. A "must take" stratum consisting of special entities such as industrial non-profit organizations, technology purchasers or vendors, and known R&D performers that do not file Scientific Research and Experimental Development (SR&ED) tax incentive applications. These special entities were all selected to be included in the sample because there are no other sources of data available for them. Industrial non-profit organizations are not eligible for tax incentives while some commercial firms opt not to make a claim.
2. The "take all" stratum comprises the largest R&D performers in each of the industrial groups. These large R&D performers represented about two-thirds of R&D expenditures in each of the specified industry groups for the previous reference year. All units in this stratum were included in the sample.
3. The "take some" stratum is composed of mid-size R&D performers in each of the specified industry group. A sample of units from this stratum was included in the sample.
4. A coverage study stratum containing 50 firms, which reported having R&D expenditures in a cross-economy pre-contact survey, but which were not otherwise part of the current RDCI frame, was added to the sample. The firms selected comprised 15 small firms in the manufacturing sector, 10 large firms in the manufacturing sector, 15 small firms from outside the manufacturing sector and 10 large firms from outside the manufacturing sector. The size of the firms was determined by their revenues. First, firms with less than \$100,000 in revenues were excluded. Then the 75th percentile of revenue was calculated for both the manufacturing sector and for all firms outside the manufacturing sector. Businesses with revenues under the 75th percentile were "small" and those with revenues over the 75th percentile were "large". Units that were in-scope contributed to the estimates and will be included in the survey frame for future collection cycles.
5. A "take none" stratum comprised of the smallest R&D performers, those firms whose total R&D expenditures comprised the bottom 5% of all R&D expenditures in each industrial group, was created to reduce response burden. Firms in the "take none" stratum were excluded from the sample.

Of the 1,947 units sampled, there were 49 industrial non-profit organizations.

Collection

Collection in reference year 2013 continued the use of two features introduced in 2010. Firstly, a failed-edit follow-up platform enabled follow-up for records that had missing or inconsistent data. Secondly, respondents were given the option of completing internet-based electronic questionnaires. These questionnaires contained some interactive edits, but all of these records received the same treatment as the data received through paper questionnaires.

Survey response

For reference year 2013 RDCI the survey response rate was 75%, (respondents / (total survey population – out-of-scope respondents)). These units accounted for 70% of the overall estimate. For the industrial non-profit component of the sample the response rate was 96% with the responding units accounting for 99% of the overall estimate.

Following data collection, survey responses are processed for tabulation and data analysis.

Processing

The RDCI database is comprised of two sources of data: questionnaire data and administrative data from Canada Revenue Agency (CRA). These administrative data consist of approved Scientific Research and Experimental Development (SR&ED) tax claims, which are also known as "T661" or "Schedule 32" claims. The SR&ED tax data are received for unique Business Numbers (BNs). The questionnaires are also collected at the same level. The Business Register, a list of all known active businesses in Canada, provides a link between these BNs and the establishments, companies and enterprises to which they relate.

Where data are available from both questionnaires and SR&ED tax records for a given company (BN) the questionnaire data are used. This is because firms need not disclose all R&D expenditures in their T661 application. They may choose to report only selected R&D projects. There are also certain capital expenditures (land and buildings for R&D) which are included in the survey questionnaire, but are excluded from the SR&ED tax incentive program. Generally, the values reported through the survey response should be greater than or equal to the SR&ED tax data. Conceptually, there should be no cases where the reverse occurs.

Data from the RDCI questionnaires, the SR&ED tax data and the Energy R&D questionnaires were reviewed for consistency and completeness. The data editing process is presented according to sequence of activities followed.

Pre-grooming of data

In the pre-grooming stage of processing, edit checks are performed to identify missing and invalid entries that would point to data records that are in error. Extreme errors resulting from processing were identified in the tax and questionnaire data. An example of an error in the tax data is an extremely high R&D expenditure value that could be the result of data capture error. Very few such errors were identified. Any record identified was corrected manually.

Missing classification information (completeness)

For the 2013 survey cycle, over one hundred SR&ED approved tax records were not classified to a North American Industry Classification System (NAICS) group. These records were manually assigned a NAICS code.

All RDCI and Energy R&D records were verified to ensure they had a postal code in order to assign them to a province.

Data editing

Editing is a process to ensure that survey data are acceptable, complete, consistent and correct. There are three main categories of edits: validity, consistency and distribution edits. Validity and consistency edits are done one record or questionnaire at a time. However, distribution edits are performed by looking at data across questionnaires.

Validity edits

Validity edits identify incoherence in the data. Examples of validity edits include:

- Respondents reporting intramural R&D performance with no R&D personnel;
- Wages and salaries for R&D which are greater than the firms total wages and salaries;
- Units of measure issues (U.S. vs. Canadian dollars, dollars vs. thousands of dollars)

Consistency edits

Consistency edits verify the relationships between questions. Consistency edits may also be applied to the logical flow of the questionnaire, or may involve the use of administrative data or historical data. These types of edits typically verify relationship between questions.

For the RDCI, some examples of consistency edits are:

- Wages and salaries and other current costs on R&D performed should equal total current costs;
- Total current costs at Canada level should equal the total current expenditures reported for provinces and territories;
- The total R&D expenditures reported for Canada should equal the total sources of funds for R&D performed;
- Total R&D expenditures should match the total for all fields of science;
- Total R&D personnel should likewise be the same across all questions.

Distribution edits

A question on the RDCI allows for the distribution of values for expenditures and personnel across provinces, while another new question allocates expenditures and personnel across science types. Expenditures are also allocated across sources of funding. These distribution questions are edited to identify outliers which are then validated.

Imputation methods employed in RDCI survey

It is not usually possible to resolve all records in error during the pre-grooming stage. Imputation replaces items that fail the edit rules to fix partial non-response or total non-response.

Imputation for RDCI uses the following data sequence:

- Actual respondent estimates from the prior year for planned expenditures;
- SR&ED tax data;
- Random ratio donors anchored to historical data.

Deterministic imputation

Deterministic imputation is done as part of the editing process. It is generally specified as action items to be performed using logic decision tables. In deterministic imputation only one value is deemed possible. Deterministic imputation is generally of the form $A+B=C$. An example would be 'total professionals + total technical and administrative staff = total R&D personnel.

Imputation by substitution

Imputation by substitution involves the use of an external data source. An auxiliary data source such as historical data or administrative data is used for missing data. For the RDCI, COA4 (explained below) and PD7 (explained below) files were used to impute revenues and employment data. The T661 (Scientific Research and Experimental Development) tax credit applications were used as an alternate data source that was treated as respondent data.

For SR&ED tax filers, revenue figures were adjusted to reflect corporate income tax data for the corresponding filer. The tax data are from T2 corporate income tax files which are mapped to the Statistics Canada's Chart of Accounts (COA) classification by firm. The variable COA4 relating to (Total) Revenues of a firm was used to improve data quality for missing or inconsistent total revenues.

The Payroll Deductions total employment data (PD7) file was also used to improve the quality of missing or inconsistent total employment data. Payroll Deduction data are monthly data, and therefore, an annual average was calculated from the Canada Revenue Agency (CRA) monthly Payroll Deduction file for all firms that reported having one or more employees in at least one of the twelve months of the tax year.

Imputation method based on estimators

Imputation method based on estimators generally refers to the use of ratios based on historical data or other variables on the questionnaire. To estimate R&D expenditures two years past the base year, editing rules were applied using donor ratios and a response was imputed based on the response of a similar firm in the same industry group. Data are modeled using mathematical formulae.

Donor records for imputation were determined by imputation class, which were defined by population subgroups, NAICS group and size. Size was determined by total R&D expenditure (total intramural and extramural expenditures) which was used to group enterprises. For the suite of RDCI surveys, the following imputation methods were employed: deterministic imputation, substitution, and use of estimators.

For example, a firm reported \$1 million for total intramural R&D expenditures for the reference year (RY) and did not report expenditures for RY+1 and RY+2. To impute for RY+1 and RY+2 periods, a donor is found within the industry group and size category. If the donor reported a 5% increase in the first year and no change from that estimate in the second year, the missing record would be imputed the following values:

RY	1,000,000 anchor
RY+1	1,050,000 imputed value
RY+2	1,000,000 imputed value

Limits on the expenditure ratio from the donor are applied such that the maximum shift between RY and RY +1 and RY and RY +2 does not exceed 20%.

Also, during the data processing stage, there is a need to create projected records to account for tax data which have not been received to date. Under the current tax regulations, firms must file their application to the SR&ED program within 18 months of expenditure. Once claims are submitted, they are processed, approved and the final approved claims are forwarded to Statistics Canada. As a result, data may not arrive for up to two years after the expenditures were incurred and occasionally longer. To address the situation, the imputation system projects existing records forward in time. As the actual administrative data arrive, these imputed records are removed from the database and replaced with the actual tax data. This imputation system confirms the firm is active using Statistics Canada's Business Register, and then applies an imputation based on industry trends. Since the imputation does not seriously influence overall trends, the R&D data are published as soon as possible after the survey is conducted, and are subject to minor revisions in subsequent publications.

The SR&ED tax data records do not have all of the detail that is found on the questionnaire. For certain portions of the questionnaire, the detail for the tax records is imputed. This is principally in the regard to planned and forecast expenditures, the level of education of the R&D personnel and the provincial distribution of R&D expenditures. For the expenditures and personnel imputation, ratios from respondents are applied to anchor variables that are available from the SR&ED tax data to impute detail. For provincial distribution, information about the structure of the enterprise is obtained from the Business Register. For simple records, the expenditures are assigned to the province from which the claim was filed. For more complex enterprises, the current R&D expenditures and personnel are allocated based on the ratios of revenues by province within the enterprise's establishments across Canada. Capital R&D expenditures are allocated to the province with the largest amount of current expenditures.

Data verification

Following the completion of the edit and imputation process, data are verified and are compared against previous years' estimates.

A general verification of components to totals and totals across the RDCI questionnaire is conducted as a first step after imputation. Values are confirmed to add up correctly and to confirm that the classification variables (NAICS, employment and revenue) exist for each record and are found reasonable, a review of the R&D micro data follows.

For the Reference Year (RY), an industry by province table is compared to the results with the published data from the previous years. Extra scrutiny is paid to the largest contributors.

For RY+1 and RY+2, patterns in the imputation of the SR&ED tax records and incomplete questionnaires are reviewed.

At this stage, verification of data is to examine and understand the underlying data and to be able to account for changes. Records are again verified for the main R&D variables by industry group and by province. The largest records for each province and industry group are reviewed to understand what underlies changes to the estimates.

Sources of errors

Coverage

Coverage errors consist of omissions, erroneous inclusions, and duplication in the frame used to conduct the survey. Survey questionnaires were sent to all known large R&D performing and/or funding firms i.e., those believed to have the largest R&D expenditures within their industry group. If a firm has never responded to the survey and does not apply for T661 tax credits, it can only be identified for the survey by mention in the media or through reporting as a recipient or source of funds from an R&D survey for other sectors (examples: government, private non-profit). Firms are added to the frame based on such a review of other sources.

Administrative data are used for the remaining R&D performing or funding firms which are not included in the questionnaire coverage. Firms have up to 18 months after their fiscal year end to file a Scientific Research & Experimental Development tax incentive program claim for their R&D expenditures.

Errors in classification, notably industrial and geographical, are also possible and would have coverage impacts within their specified categories.

Non-response

Non-response errors occur when there is no response to one or all of the survey questions. Non-response leads to an increase in variance as a result of a reduction in the actual size of the sample. Imputing for non-response may produce a bias if the non-respondents have characteristics of interest that are different from those of the respondents.

Non-response is a concern in a couple of areas. One is the estimate of R&D expenditures two years past the base year (planned and forecast R&D expenditures). Non-response is an issue for this question as some firms are hesitant to estimate likely expenditures. If no response is provided, editing rules are applied and a response is imputed based on the response of a similar firm in the same industry group. Mitigation of non-response for this question consists of specific training of data collection staff to understand the importance of these data and to be able to explain their importance to respondents.

The second issue involves the use of SR&ED tax data for the remaining R&D performers. These data represent approximately one-third of all R&D performed by businesses by value. The SR&ED tax records do not contain as much information as those from the questionnaire. The data not contained on the tax form are imputed based the respondent data from questionnaires, based on the imputation criteria specified previously.

Non-response is generally addressed through imputation. Automatic imputations are made for the SR&ED tax data population as well as for non-response and invalid response within the questionnaire portion of the sampled population.

Response errors

Response errors occur when the response provided differs from the real value; such errors may be attributable to the respondent, the interviewer, the questionnaire, the collection method or the respondent's record-keeping system.

Processing and data capture

Processing errors occur at subsequent stages of the process, when checking, coding, entering, imputing, and tabulating data.

Processing errors are monitored and controlled using quality control techniques. Detailed examination is performed on numerous tables and listings as part of data validation and analysis before publication tables are created.

Sampling

Sampling errors occur when the sample is not representative of the population. As the RDCI is a census there are no sampling errors.

Comparisons with other data sources

Discrepancies between federal government reporting of funds to industry (the business enterprise sector) for R&D and industry's reporting of such funds may exist as a result of different interpretations of the character of R&D. For example, a federal government department may regard a contract to industry for the building of a prototype (e.g., communications satellite) as R&D. The contractors and subcontractors, however, may only use a portion of the R&D contract. It may even be reported in a different fiscal period. This activity may not be reported at all because the contract is considered as part of the firm's "routine" contract work. Differences may also arise for contracts awarded to industry for services or equipment required for a government in-house project which are reported by the federal sponsor as industrial R&D contracts. Therefore, the totals for R&D grants and contracts from the federal government to industry shown in this publication may not agree with those reported in Federal Science Activities, 2013/2014, (Catalogue no. 88-204-X).

Industrial Classification

The RDCI survey is designed to reflect respondents as they are classified on the Business Register and the structure of the firm as it reports its R&D activities (including reporting R&D expenditures for the SR&ED tax incentive program). As a result, a firm can only be assigned to one industry although that firm may be engaged in activities in several industries. The assignment is based on the activity from which the firm derived the greatest portion of its value added.

Research and Development in Canadian Industry (RDCI) surveys enterprises: An enterprise is defined as a business unit that directs and controls the allocation of resources relating to its operations, and for which consolidated financial and balance sheet accounts are maintained. The activity with the most economic weight or importance determines the NAICS code that Statistics Canada assigns to the enterprise.

The unit of measure for most economic production surveys is the establishment. In the case of the RDCI, the unit of measure is the enterprise, which may include a number of establishments. Differences in the unit of measure, therefore, may make comparison between the RDCI and economic production surveys difficult.

The economic importance of activities undertaken by enterprises can vary from year to year due to changes in market conditions, for instance, in the relative importance of wholesaling, manufacturing and scientific research and development services undertaken by the enterprise. Industries illustrating movements between NAICS codes due to changes in the influence of activities include pharmaceuticals. From year to year, the most important economic activity of these enterprises can move among pharmaceutical and pharmacy supplies wholesaler-distributors (NAICS 414510), pharmaceutical and medicine manufacturing (NAICS 325410) and scientific research and development services in the physical, engineering and life sciences (NAICS 541710). Enterprises can shift between natural resources and manufacturing industries.

Those enterprises with economic activities related to fossil fuels, specifically oil and gas and their refined products also often show movement between NAICS codes. For example, enterprises performing R&D can move between oil and gas extraction (NAICS 2111) and petroleum and coal product manufacturing (NAICS 3241).

Industrial R&D personnel estimates

There are two sources of data for the industrial R&D personnel estimates: questionnaire estimates for firms covered by the Research and Development in Canadian Industry (RDCI) survey; and administrative data taken from final approved Scientific Research and Experimental Development (SR&ED) tax incentive program claims. Where data are available from both sources, respondent data from the questionnaire are used.

Users are advised that there are differences in the data collected from the two sources of industrial R&D personnel data. The two most important differences are outlined below.

First, the SR&ED tax incentive program claims for R&D personnel are not revised through the review cycle of the claims. Therefore, the final approved claims, which may have had projects denied, will contain the estimated number of R&D personnel from the original claim. Statistics Canada performs data coherence exercises on the supplied SR&ED R&D personnel data using relationships between wages and salaries to estimated number of R&D personnel, reviewing other current costs combined with wages and salaries to estimated number of R&D personnel and relationship of number of R&D personnel to total employment of the claimant.

Second, the SR&ED tax incentive program claims do not collect R&D personnel by level of education. Therefore, for the total universe data are imputed based upon response to the RDCI survey. The data quality for imputation of industrial R&D personnel by level of education for all industries is acceptable. Users are cautioned that industrial R&D personnel data by level of education, by industrial detail, and/or by provincial distribution are subject to suppression for quality reasons.

Estimates

Quality indicators are provided based on the impact of imputation on the estimate. These indicators are as follows:

Text table 2
Quality indicators

Symbol	Meaning	Coefficient of variation
A	Excellent	0 to 4.9%
B	Very good	5.0% to 9.9%
C	Good	10.0% to 14.9%
D	Acceptable	15.0% to 24.9%
E	Use with caution	25.0% to 34.9%
F	Too unreliable to be published	> 35.0%

Quality indicators

Confidentiality programs are also applied to ensure that the release of data conforms to Statistics Canada policy on confidentiality.

Technical notes

Data availability

Data for the reference year 2013 are available for all tables with the exception of counts of firms.

In the even years prior to 1982 and for 1992 and 1994, the estimation procedures did not permit the preparation of tables based on revenue size, employment size, sources of funds and country of control of firms.

Regional data on research and development (R&D) expenditures and personnel are only available for 1977, 1979 and 1981 to 2013.

Terminology

The following terminology is used within the publication:

Performing company: is the organization which carried out the R&D. In the case of a consolidated return, performing company could include several companies. It also includes divisions of an enterprise which send separate returns or organizations such as industrial non-profit organizations.

Related companies: Includes parent, subsidiary and other affiliated companies. In the case where a consolidated return is submitted, "related companies" would exclude companies included in the consolidation.

R&D contracts for other companies: R&D contract work performed by the reporting company for other companies.

Federal grants: Federal R&D grants and the R&D portion of any other federal grants; it excludes funds or tax credits from R&D tax incentives.

Federal contracts: Federal R&D contracts and the R&D portion of any other federal contracts.

Provincial sources: Provincial R&D grants and contracts, and the R&D portion of any provincial grants and contracts; it excludes funds or tax credits from R&D tax incentives.

Other Canadian sources: Includes funds from universities and from levels of government other than federal and provincial.

Intramural expenditures: Expenditures for R&D work performed within the reporting company, including work financed by others.

Current intramural expenditures: Labour costs, fringe benefits and other current costs for R&D, including non-capital purchases of materials, supplies and equipment but excluding capital depreciation. Current intramural expenditures also include contracts for services required to carry out R&D (e.g. contracts awarded for drilling needed for heavy oil R&D).

Capital expenditures: Expenditures on fixed assets used in the R&D program, classified into land, buildings, and equipment.

Revenues: Revenues resulting from the sale of products and services (after deducting sales and excise taxes), and other revenues such as those generated from investment and rentals.

Non-commercial firms: R&D performers without a directly affiliated Canadian commercial base. Included are industrial non-profit organizations and trade associations, R&D performed by consortia, and R&D performed by non-residents without associated commercial enterprises and funded principally from abroad.

Country of control: In most cases of foreign control, the country of control is the country of residence of the ultimate foreign controlling parent corporation, family, trust, estate or related group. Each subsidiary within the global enterprise is assigned the same country of control as its parent. A corporation whose voting rights are equally owned by Canadian-controlled and foreign-controlled corporations is Canadian-controlled. If two foreign-controlled corporations jointly own an equal amount of the voting rights of a Canadian resident corporation, the country of control is assigned according to an order of precedence based on their aggregate level of foreign control in Canada. For example, United States takes precedence over all other foreign countries because it has the highest level of aggregate foreign control in Canada.

R&D personnel: Calculated in full-time equivalent (FTE). R&D may be carried out by persons who work solely on R&D projects or by persons who devote only part of their time to R&D, and the balance to other activities such as testing, quality control and production engineering. To arrive at the total effort devoted to R&D in terms of person-years, it is necessary to estimate the full-time equivalent of these persons working only part-time in R&D.

Professional personnel: are researchers or R&D managers. They can be either scientists or engineers. Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned. Managers and administrators engaged in the planning and management of the scientific and technical aspects of a researcher's work also fall into this category.

Scientists and engineers: Are professionally trained to conduct investigations or enquiries to acquire a theoretical, abstract or practical knowledge of physical and natural phenomena, improve or develop concepts, theories and operational methods, or apply scientific and technological knowledge relating to fields such as physics, astronomy, meteorology, chemistry, geophysics, geology, mathematics, statistics, computing, architecture, engineering and technology.

Senior administrators and managers: Managers and administrators engaged in the planning and management of the scientific and technical aspects of a researcher's work also fall into this category.

Technical and administrative support personnel: Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences. Other supporting staff includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects. Both technical and administrative support personnel work to directly support the activities of researchers.

Technicians and technologists: Technically trained personnel who assist scientists and engineers in R&D, e.g. chemical technicians, draftspersons. They may be certified by either provincial educational authorities or by provincial or national scientific or engineering associations.

Other administrative support: Personnel directly engaged in the R&D program, e.g. machinists and electricians in construction of prototypes, or clerks, typists, accountants and storekeepers engaged in the administration or clerical support of R&D firms.

Full-time equivalent (FTE) = number of persons who work solely on R&D projects + estimate of time of persons working only part of their time on R&D.

Example calculation:

If out of four scientists engaged in R&D work, one works solely on R&D projects and the remaining three devote only one quarter of their working time to R&D, then: $FTE = 1 + 1/4 + 1/4 + 1/4 = 1.75$ scientists.

Federal government funds for industrial R&D: Federal support consists of grants and contracts for R&D to be performed by business enterprises. Taxes foregone as a result of income tax incentives for R&D are not considered direct government support and are not attributed to the federal government.

Industrial classification

North American Industry Classification System (NAICS) is the standard industrial classification system used for presenting R&D expenditures data for the business enterprise sector. There are limitations to its use. One important limitation is due to firms with activities in more than one industry (e.g., firms which both refine petroleum and extract oil). Another is caused by the concentration of the R&D activity among a few firms. In order to prevent disclosure of individual respondents NAICS codes may be combined to provide sufficient observations for publication.

A third problem is that the classification, chosen to represent general industrial activity, may not be entirely suitable for identifying firms chosen only for their involvement in R&D.

There are some restrictions on the application of the NAICS, for example, large R&D performing firms that are classified as "holding companies" are assigned to the principle industrial activity of the firm.

The R&D activities of other sectors such as the federal government, provincial governments, higher education, and private non-profit organizations are covered in other reports.

Definitions

Research and development

For the purpose of this survey, research and development (R&D) is systematic investigation carried out in the natural and engineering sciences by means of experiment or analysis to achieve a scientific or technological advance.

Research is original investigation undertaken on a systematic basis to gain new knowledge.

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.

Example:

The investigation of electrical conduction in crystals was research. The application of this knowledge to the creation of a new amplifying device - the transistor - was development. The application of the device to the construction of new electrical circuits for television receivers was development. The formulation of new plastic cases for a television receiver is design, not development.

Research and development may be carried out either by a permanent R&D unit (e.g., R&D division) or by a unit generally engaged in any non-R&D activity such as engineering or production. In the first case, the R&D unit may spend part of its time on routine testing or trouble shooting or on some other activities which should not be included in R&D. In the second, only the R&D portion of such units' total activity should be considered.

Research and development should be considered to be "scientific research and experimental development" as defined in Section 37, Regulation 2900 of the Income Tax Act; this section specifically excludes the following:

- i. market research, sales promotion,
- ii. quality control or routine analysis and testing of materials, devices or products,
- iii. research in the social sciences or the humanities,
- iv. prospecting, exploring or drilling for or producing minerals, petroleum or natural gas,
- v. the commercial production of a new or improved material, device or product or the commercial use of a new or improved process,
- vi. style changes, or routine data collection

Note:

Although the definition of "scientific research and experimental development" is considered to be the same as R&D, certain expenditures for scientific research cannot be claimed for income tax purposes (e.g., land, building). All expenditures attributable to R&D are included in this report.

Appendix I

North American Industry Classification System 2012 by Industry group

Text table 1

North American Industry Classification System 2012 by Industry group

	NAICS code
Agriculture, forestry, fishing and hunting	
Agriculture	111110, 111120, 111130, 111140, 111150, 111160, 111190, 111211, 111219, 111310, 111320, 111330, 111411, 111419, 111421, 111422, 111910, 111920, 111930, 111940, 111993, 111994, 111999, 112110, 112120, 112210, 112310, 112320, 112330, 112340, 112391, 112399, 112410, 112420, 112910, 112920, 112930, 112991, 112999, 115110, 115210, 115212, 113110, 113210, 113311, 113312, 115310, 114113, 114114, 114210, 112510
Forestry, logging and support activities for forestry	
Fishing, hunting, trapping and animal aquaculture	
Mining, quarrying, and oil and gas extraction	
Oil and gas extraction, contract drilling and related services	211113, 211114, 213111, 213118
Mining and quarrying, contract drilling and related support activities	212114-212116, 212210, 212220, 212231-212233, 212291, 212299, 212314-212317, 212323, 212326, 212392-212398, 213117, 213119
Utilities	
Electric power generation, transmission and distribution	221111-221113, 221119, 221121, 221122
Other utilities	221210, 221310, 221320, 221330, 562110, 562210, 562910, 562920, 562990
Construction	236110, 236210, 236220, 237110, 237120, 237130, 237210, 237310, 237990, 238110, 238120, 238130, 238140, 238150, 238160, 238170, 238190, 238210, 238220, 238291, 238299, 238310, 238320, 238330, 238340, 238350, 238390, 238910, 238990
Manufacturing	
Food manufacturing	311111, 311119, 311211, 311214, 311221, 311224, 311225, 311230, 311310, 311340, 311351, 311352, 311410, 311420, 311511, 311515, 311520, 311611, 311614, 311615, 311710, 311811, 311814, 311821, 311824, 311830, 311911, 311919, 311920, 311930, 311940, 311990, 312110, 312120, 312130, 312140, 312210, 312220
Beverage and tobacco product manufacturing	313110, 313210, 313220, 313230, 313240, 313310, 313320, 314110, 314120, 314910, 314990
Textile mills and textile product mills	321111, 321112, 321114, 321211, 321212, 321215-321217, 321911, 321919, 321920, 321991, 321992, 321999
Wood product manufacturing	322111, 322112, 322121, 322122, 322130, 322211, 322212, 322219, 322220, 322230, 322291, 322299
Paper manufacturing	323113-323116, 323119, 323120
Printing and related support activities	324110, 324121, 324122, 324190
Petroleum and coal products manufacturing	325410
Pharmaceutical and medicine manufacturing	325110, 325120, 325130, 325181, 325189, 325190, 325210, 325220, 325313, 325314, 325320, 325510, 325520, 325610, 325620, 325910, 325920, 325991, 325999
Other chemicals manufacturing	326111, 326114, 326121, 326122, 326130, 326140, 326150, 326160, 326191, 326193, 326196, 326198, 326210, 326220, 326290
Plastic product manufacturing	327110, 327120, 327214, 327215, 327310, 327320, 327330, 327390, 327410, 327420, 327910, 327990
Rubber product manufacturing	331110, 331210, 331221, 331222, 331511, 331514
Non-metallic mineral product manufacturing	331313, 331317, 331410, 331420, 331490, 331523, 331529
Primary metal (ferrous) manufacturing	332113, 332118, 332210, 332311, 332314, 332319, 332321, 332329, 332410, 332420, 332431, 332439, 332510, 332611, 332619, 332710, 332720, 332810, 332910, 332991, 332999
Primary metal (non-ferrous) manufacturing	333110, 333120, 333130, 333245, 333246, 333247, 333248, 333310, 333413, 333416, 333511, 333519, 333611, 333619, 333910, 333920, 333990
Fabricated metal product manufacturing	334110
Machinery manufacturing	334210, 334220, 334290, 334410
Computer and peripheral equipment manufacturing	
Communications equipment manufacturing	
Semiconductor and other electronic component manufacturing	334511, 334512
Navigational, measuring, medical and control instrument manufacturing	
Other computer and electronic products manufacturing	334310, 334610
Electrical equipment, appliance and component manufacturing	335110, 335120, 335210, 335223, 335229, 335311, 335312, 335315, 335910, 335920, 335930, 335990
Motor vehicle and parts manufacturing	336110, 336120, 336211, 336212, 336215, 336310, 336320, 336330, 336340, 336350, 336360, 336370, 336390, 336410
Aerospace products and parts manufacturing	336510, 336611, 336612, 336990
All other transportation equipment manufacturing	

Text table 1 – continued

North American Industry Classification System 2012 by Industry group

NAICS code

Furniture and related product manufacturing	337110, 337121, 337123, 337126, 337127, 337213-337215, 337910, 337920
Other manufacturing industries	315110, 315190, 315210, 315220, 315241, 315249, 315281, 315289, 315990, 316110, 316210, 316990, 339110, 339910, 339920, 339930, 339940, 339950, 339990
Services	
Wholesale trade	411110, 411120, 411130, 411190, 412110, 413110, 413120, 413130, 413140, 413150, 413160, 413190, 413210, 413220, 413310, 414110, 414120, 414130, 414210, 414220, 414310, 414320, 414330, 414390, 414410, 414420, 414430, 414440, 414450, 414460, 414470, 414510, 414520, 415110, 415120, 415190, 415210, 415290, 415310, 416110, 416120, 416210, 416310, 416320, 416330, 416340, 416390, 417110, 417210, 417220, 417230, 417310, 417320, 417910, 417920, 417930, 417990, 418110, 418120, 418190, 418210, 418220, 418310, 418320, 418390, 418410, 418910, 418920, 418930, 418990, 419110, 419120, 419190, 441110, 441120, 441210, 441220, 441310, 441320, 442110, 442210, 442291, 442292, 442298, 443143, 443144, 443145, 443146, 444110, 444120, 444130, 444190, 444210, 444220, 445110, 445120, 445210, 445220, 445230, 445291, 445292, 445299, 445310, 446110, 446120, 446130, 446191, 446199, 447110, 447190, 448110, 448120, 448130, 448140, 448150, 448191, 448199, 448210, 448310, 448320, 451111, 451112, 451113, 451119, 451120, 451130, 451140, 451310, 452110, 452910, 452991, 452999, 453110, 453210, 453220, 453310, 453910, 453920, 453930, 453992, 453999, 454110, 454210, 454311, 454312, 454319, 454390
Retail trade	481110, 481214, 481215, 482112-482114, 483115, 483116, 483213, 483214, 484110, 484121, 484122, 484210, 484221-484223, 484229, 484231-484233, 484239, 485110, 485210, 485310, 485320, 485410, 485510, 485990, 486110, 486210, 486910, 486990, 487110, 487210, 487990, 488111, 488119, 488190, 488210, 488310, 488320, 488331, 488332, 488339, 488390, 488410, 488490, 488511, 488519, 488990, 491110, 492110, 492210, 493110, 493120, 493130, 493190
Transportation and warehousing	511110, 511120, 511130, 511140, 511190, 511211, 511212, 512110, 512120, 512130, 512190, 512210, 512220, 512230, 512240, 512290, 515110, 515120, 515210, 517111, 517112, 517210, 517410, 517910, 518210, 519110, 519121, 519122, 519130, 519190
Information and cultural industries	521110, 522111, 522112, 522130, 522190, 522210, 522220, 522291, 522299, 522310, 522321, 522329, 522390, 523110, 523120, 523130, 523140, 523210, 523910, 523920, 523930, 523990, 524111, 524112, 524121-524125, 524129, 524131-524135, 524139, 524210, 524291, 524299, 526111, 526112, 526911-526917, 526919, 526930, 526981, 526989, 531111, 531112, 531120, 531130, 531190, 531211, 531212, 531310, 531320, 531390, 532111, 532112, 532120, 532210, 532220, 532230, 532290, 532310, 532410, 532420, 532490, 533110
Finance, insurance and real estate	541310, 541320, 541330, 541340, 541350, 541360, 541370, 541380, 541514, 541515, 541611, 541612, 541619, 541620, 541690
Architectural, engineering and related services	541710, 541720
Computer system design and related services	621110, 621210, 621310, 621320, 621330, 621340, 621390, 621410, 621420, 621494, 621499, 621510, 621610, 621911, 621912, 621990, 622111, 622112, 622210, 622310, 623110, 623210, 623221, 623222, 623310, 623991-623993, 623999, 624110, 624120, 624190, 624210, 624220, 624230, 624310, 624410, 541110, 541120, 541190, 541212, 541213, 541215, 541410, 541420, 541430, 541490, 541810, 541820, 541830, 541840, 541850, 541860, 541870, 541891, 541899, 541910, 541920, 541930, 541940, 541990, 551113, 551114, 561110, 561210, 561310, 561320, 561330, 561410, 561420, 561430, 561440, 561450, 561490, 561510, 561520, 561590, 561611-561613, 561621, 561622, 561710, 561721, 561722, 561730, 561740, 561791, 561799, 561910, 561920, 561990, 611110, 611210, 611310, 611410, 611420, 611430, 611510, 611610, 611620, 611630, 611690, 611710, 711111, 711112, 711120, 711130, 711190, 711211, 711213, 711218, 711311, 711319, 711321, 711322, 711329, 711410, 711511, 711512, 711513, 712111, 712115, 712119, 712120, 712130, 712190, 713110, 713120, 713210, 713291, 713299, 713910, 713920, 713930, 713940, 713950, 713990, 721111-721114, 721120, 721191, 721192, 721198, 721211-721213, 721310, 722310, 722320, 722330, 722410, 722511, 722512, 811111, 811112, 811119, 811121, 811122, 811192, 811199, 811210, 811310, 811411, 811412, 811420, 811430, 811490, 812114-812116, 812190, 812210, 812220, 812310, 812320, 812330, 812910, 812921, 812922, 812930, 812990, 813110, 813210, 813310, 813410, 813910, 813920, 813930, 813940, 813990, 814110, 911110, 911210, 911220, 911230, 911240, 911290, 911310, 911320, 911390, 911410, 911420, 911910, 912110, 912120, 912130, 912140, 912150, 912190, 912210, 912910, 913110, 913120, 913130, 913140, 913150, 913190, 913910, 914110, 919110
All other services	