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Innovation Analysis Bulletin

A report from Statistics Canada with statistical and analytical updates on:

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Besides the articles to which we refer in this bulletin, Statistics Canada's Web site provides a wealth of statistics, facts and research papers on a variety of related topics. As well, the questionnaires we have used to collect the information are available for research purposes.

Symbols

.	not available for any reference period
..	not available for a specific reference period
...	not applicable
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

Organizational and technological improvements in Canadian firms and organizations, 2004 to 2006

The 2006 Survey of Electronic Commerce and Technology (SECT) included two questions that dealt with the issues of organizational and technological change. This article will examine organizational and technological change in the private and public sectors, providing the first look at these cross-economy data. An upcoming article will explore the relationship between the introduction of significantly improved organizational structures, management techniques, or technology and the training associated with the implementation of these changes.

On the 2006 SECT questionnaire, firms and organizations were asked:

"During the last three years, 2004 to 2006, did your organization introduce significantly improved organizational structures or implement improved management techniques?"

During the years 2004 to 2006, just over one-third of private firms (35.5%) introduced significantly improved organizational structures or improved management techniques. In contrast, approximately double that proportion of public organizations did so (71.0%).

In the second part of the question, firms and organizations were asked:

"During the last three years, 2004 to 2006, did your organization introduce significantly improved technologies?
If yes, how did you introduce significantly improved technologies?

- *By purchasing off-the-shelf technologies?*
- *By licensing new technologies?*
- *By customizing or significantly modifying existing technologies?*
- *By developing new technologies? (either alone or in conjunction with others)"*

Firms were able to select more than one response for how they chose to introduce technology. The introduction of significantly improved technologies is an important measure, as the acquisition rate is one indicator of economic innovation (OECD/Eurostat 1997).

During the three years, 2004 to 2006, approximately four out of ten (42.8%) private firms introduced a significantly improved technology, a result consistent with what was found six years ago when the question was asked previously. Again, public sector organizations were found to be twice as likely to have introduced a significantly improved technology, as approximately eight out of ten (81.8%) organizations did so.

About this article

The Survey of Electronic Commerce and Technology is an annual cross-economy survey that is sent to a sample of approximately 20,000 private firms and public organizations. The full set of estimates on which this article is based are available on the CANSIM module of the Statistics Canada website (www.statcan.gc.ca).

Questions asked in this module were also asked in the 2000 Survey of Electronic Commerce and Technology. Analysis of results from the 2000 survey is available in two papers written by Louise Earl of the Science, Innovation and Electronic Information Division.

An overview of organisational and technological change in the private sector, 1998-2000 (Earl 2002a).

Innovation and change in the public sector: A seeming oxymoron (Earl 2002b).

More information about the Survey of Electronic Commerce and Technology is available at http://www.statcan.ca/english/sdds/4225.htm.

A closer look at organizational change

As mentioned above, just over one-third of private firms introduced significantly improved organizational structures or management techniques during the three years, 2004 to 2006. However, there were variations in the proportion of firms introducing such changes across sectors and across size classes. The nature of such changes may range widely, varying from a shift in resources to a massive change in overall corporate culture.

Large firms of between 100 and 499 employees were more likely (67.9%) to have enacted significantly improved organizational structures or management techniques than their

smaller counterparts with less than 100 employees (38.2%). In a large firm, there may be many more opportunities for changes in organizational structure or management techniques because of the sheer volume of staff and presumably, each of these changes are made with the expectation of significant improvements.

Private firms in the goods producing sector (47.1%) were more likely than firms in the services producing sector (34.5%) to have introduced significantly improved organizational structures or management techniques during the three years, 2004 to 2006. This higher rate of introduction may be partly explained by the size of firms. As discussed above, those firms in the goods producing sector tend to be larger than those in the services producing sector. When only firms with over 100 employees are considered, there is no difference between the goods and services sectors in the rate of introduction of significantly improved organizational structures or management techniques.

Technological change: The who and the how

Similar to the pattern observed with organizational change, there were variations in the proportion of firms introducing new technologies across industries. Technological change was influenced by both industry and size effects.

Private firms in the goods producing sector (48.3%) were more likely to have introduced a significantly improved technology than their counterparts in the services producing sector (42.3%). However, once entrepreneurial firms with no employees or firms that rely solely on contract workers are excluded from the estimates, there is no difference between the goods and services producing sectors.

Firms in the information and cultural services sector (71.8%), an intangible service, had a higher proportion of firms that introduced significantly improved technologies than any of the sectors found in the goods related services sector: wholesale trade (45.1%); retail trade (42.4%); and transportation and warehousing (34.5%).

As may be expected, large firms were most likely to introduce significantly improved technologies. Large firms often have the monetary resources available to introduce new technologies and the human resources available to implement them. While about four out of ten (43.6%) private firms with 1 to 99 employees introduced significantly improved technologies, this was the case for seven out of ten (71.4%) private firms with 100 to 499 employees, and for nearly eight out of ten (78.4%) private firms with more than five hundred employees.

This size effect carries over to public sector organizations as well, where six out of ten (61.4%) public organizations with between 1 to 99 employees introduced a significantly improved technology, compared to nine out of ten organizations with over five hundred employees.

Of those firms that introduced a significantly improved technology, seven out of ten (68.6%) did so by purchasing off-the-shelf technology, almost one-quarter (23.1%) did so by licensing, four out of ten (40.2%) customized or significantly modified existing technology, and two out of ten (22.7%) developed a new technology.[1]

Larger firms, those with 100 to 499 employees, were more likely to develop new technologies (39.0%) than those firms with 1 to 99 employees (21.4%). Interestingly, there are no differences across size classes in the proportion of firms that introduced new technology by purchasing off-the-shelf. A questionnaire designed to explore further the characteristics of firms that modify existing technology and develop new technology was sent to respondents in the spring of 2008. Results from this survey will be disseminated as part of a larger analytical study on user innovation in the fall of 2008.

A higher proportion of public sector organizations customized or significantly modified existing technologies (52.6%) or developed new technologies (39.3%) than private firms. This could be a result of the tendency of public organizations to be larger than their private counterparts, or could also reflect that more public organizations are able to absorb the risk involved in modifying an existing technology or developing a new one instead of purchasing a proven technology off-the-shelf.

It is not surprising to see that methods requiring a high level of sophistication in the method of introduction were less common among firms. Developing a new technology or customizing an existing technology takes more resources and expertise than simply licensing a technology or purchasing one off-the-shelf. Further analysis and exploration of this topic using data from this questionnaire will be available in an upcoming working paper.

Note

1. Note that these estimates do not sum to one hundred percent, as respondents were asked to report all methods that had been used in the previous three years.

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Mark Uhrbach, Manufacturing and Energy Division (MED), Statistics Canada

Research and development of Canadian Private Non-profit organizations, 2006

This article highlights expenditures and personnel devoted annually to scientific research and development (R&D) by Canadian private non-profit (PNP) organizations. These organizations play an important role in the Canadian R&D landscape: providing financial support to researchers in universities and other laboratories and performing their own research.

The R&D expenditures of PNP organizations performing their own research have been included as one of the sectors within the gross domestic expenditures on research and development (GERD) data in Canada since 1976. The GERD data serve many users including federal and provincial government analysts who develop and monitor programs aimed at stimulating science and technology in the Canadian economy, international organizations, university researchers, business enterprises, the general public and the media.

Although the contribution of the PNP sector to the national R&D effort is small in performance dollar terms (generally 0.4% of GERD), its impact in funding R&D (about 2.9% of GERD), specifically in the higher education sector, is important. The PNP sector funds almost one-tenth of R&D performed by the higher education sector, the second largest national performer of R&D behind the business enterprise sector.

The organizations which make up the PNP sector that are active in R&D are grouped into three types:

- *Private philanthropic foundations*
- *Voluntary health organizations*
- *Research institutes*

Private philanthropic foundations are active mainly in charitable and educational work rather than R&D and therefore allocate all of their R&D funds to extramural projects carried out by other non-profit organizations or in universities. Examples of such activities include improving health care availability, or educating and communicating information on various areas of interest.

Larger voluntary health organizations are generally concerned with a specific topic, for example, cancer treatment and research. Most of their funds come from individuals and organizations through periodic campaigns or bequests. The support of medical R&D accounts for all of their expenditures.

Research institutes conduct most of the R&D in the sector, largely in the medical sciences.

The total intramural R&D expenditures of private non-profit (PNP) organizations were $125 million in 2006 (current dollars). Based on constant dollars, preliminary data for 2006 indicate that growth continued in the sector (4%), but at a slower pace than for 2004 and 2005 (8% and 10% respectively).

Approximately one-half of the R&D expenditures performed by PNP organizations in 2006 was financed by the performing PNP organizations (including other Canadian sources which are primarily funding PNP organizations) and business enterprises (Table 1). The government share is equal to that of the performing PNP organisations. Foreign funding, while a very small contributor to the sector's R&D funding, has increased its share five-fold since 2001.

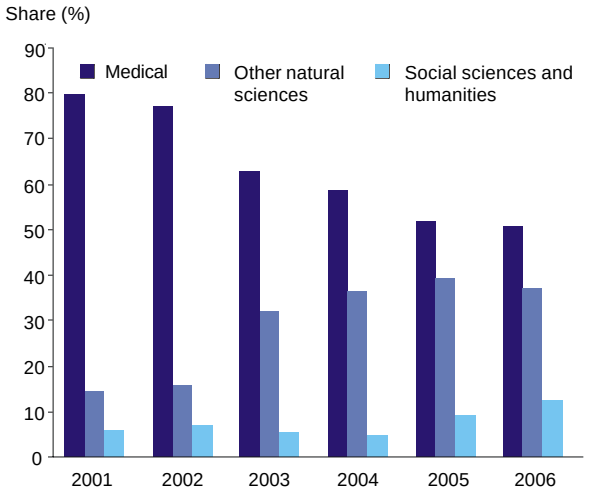
Table 1
Sources of funds for PNP intramural R&D, 2006 (millions $)

	2006
	current dollars
Performing PNP	49
Government	49
Business enterprises	14
Foreign sources	13
Total	**125**

Source: Statistics Canada, Survey of Research and Development of Canadian Private Non-Profit Organizations, 2006.

In 2006, half of the PNP organizations' intramural R&D funds were received by medical sciences compared to 79% in 2001 (Chart 1). Other natural sciences increased their share from 14% to 37% during the same time period. Social sciences and humanities more than doubled their share of total expenditures (5.9% to 12.4%). Examples of social sciences and humanities research include developing family policy, promoting mental health, and analyzing and critiquing public policy issues.

Chart 1
Private non-profit R&D expenditures by field of R&D, 2001 to 2006



Source: Statistics Canada, Survey of Research and Development of Canadian Private Non-Profit Organizations, 2001 to 2006.

There has been a slight shift in the percentage of persons engaged in R&D in the PNP sector by occupational category from 2001 to 2006 (Table 2). Comparing 2001 to 2006, scientists and engineers experienced an increase of about six percentage points, while technicians and technologists have shown only a slight increase. The 'other' occupational category[1] experienced a decrease by about eight percentage points.

Table 2
Percentage of persons engaged in R&D by occupational category, Private non-profit organizations, 2001 and 2006

	2001	2006
Scientists and engineers	34.1	39.7
Technicians and technologists	32.7	34.9
Other	33.2	25.4
Total	**100**	**100**

Source: Statistics Canada, Survey of Research and Development of Canadian Private Non-Profit Organizations, 2001 and 2006.

Note

1. The 'other' category includes persons directly engaged in R&D, i.e. machinists and electricians engaged in construction of prototypes, or staff engaged in the administration or clerical support of R&D units.

Catherine ten Den, SIEID, Statistics Canada

Commercialization activities of innovative manufacturing plants: Findings from the Survey of Innovation, 2005

Innovation commercialization, the process of introducing a new or significantly improved product to market, is an important innovation activity for a plant and is the final stage in new product development. Without successful commercialization, innovations may not return any benefits for a plant's innovation efforts. The Survey of Innovation 2005 asked innovative manufacturing plants questions related to commercialization activities and provides information on the type of these activities being undertaken. Market success is measured in terms of the share of revenues in 2004 from product innovations introduced during the years 2002 to 2004.

Based on the *Oslo Manual* guidelines[1], the Survey of Innovation 2005 defines an 'innovative' plant as one that has introduced a new or significantly improved good or service (product) to the market, or a new or significantly improved process, including a new or significantly improved way of delivering goods or services; a 'non-innovative' plant has made no such introductions. Only innovations occurring during the three-year survey reference period, 2002 to 2004, were considered in this analysis.

About this article

The sample unit for the Survey of Innovation 2005 was the 'statistical establishment,' for which the questionnaire substituted 'plant.' The more familiar latter term is also used in this article.

In the charts, each estimate is graphically illustrated as a horizontal or vertical bar. The confidence interval[2], a line extending through the end of each bar, shows that the estimate lies within the indicated range of values 95% of the time. Individual estimates with confidence intervals that overlap are not statistically significantly different from each other; those with confidence intervals that do not overlap are statistically significantly different from each other.

More information about the Survey of Innovation is available at http://www.statcan.ca/english/sdds/4218.htm.

Results from the 2005 Survey of Innovation are now available. Please contact susan.schaan@statcan.gc.ca for more information.

Results

At least two-thirds of innovative manufacturing plants engaged in an activity related to the commercialization of their innovation

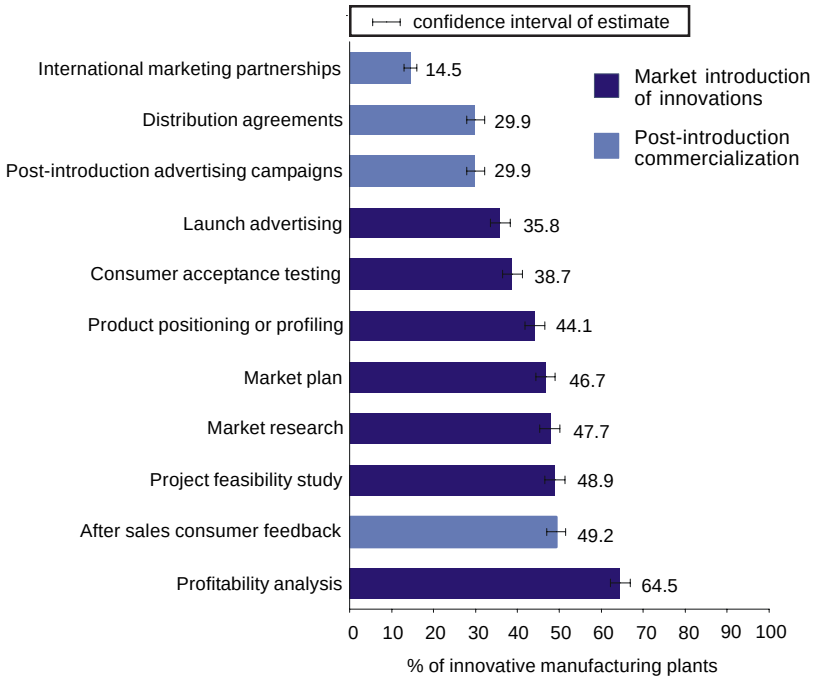
Four out of five (84.0%) innovative manufacturing plants engaged in activities for the market introduction of their product (good or service) innovations, and two-thirds (66.5%) of innovative plants undertook activities to assure the commercial success of their product innovations during the three years 2002 to 2004. This shows that innovative manufacturing plants were more likely to undertake activities for the market introduction of product innovations than activities to assure their commercial success.

Profitability analysis was the most common commercialization activity of innovative plants

Profitability analysis was the commercialization activity carried out by the highest percentage of innovative plants, with almost two-thirds (64.5%) engaged in this activity (Chart 1). After sales consumer feedback, project feasibility studies, market research, market planning, and product positioning or profiling were among the next most common activities, each carried out by about one-half of innovative manufacturing plants. Consumer acceptance testing and launch advertising were the commercialization activities related to market introduction of innovations undertaken by the lowest percentage of innovative manufacturing plants, with about one-third of plants engaged in these activities.

Three post-introduction commercialization activities were the least likely commercialization activities to be undertaken. Less than one-third (29.9%) of innovative manufacturing plants engaged in post-introduction advertising campaigns or distribution agreements and less than one-fifth (14.5%) engaged in international marketing partnerships.

Chart 1
Percentage of innovative manufacturing plants engaged in activities for innovation commercialization during the three years, 2002 to 2004



Source: Statistics Canada, Survey of Innovation, 2005.

Virtually all product innovative plants successfully commercialized their innovations

What sort of indicators exist for the successful commercialization of a product innovation? If the innovation returned revenues it could be considered to have some degree of success. Accordingly, virtually all plants successfully commercialized product innovations in 2004 that were introduced during the years 2002 to 2004, that is, they received some revenues from the innovation (Chart 2). Some of these innovations were products that were already available from competitors, while others were not.

Product innovations introduced between 2002 and 2004 made up about one-sixth of plant revenues in 2004

The percentage of total revenues derived from product innovations is another indicator of the success of product commercialization. There was no significant difference in percentage of revenues derived from innovations whether the innovation was introduced before competitors, or if it was already available (Chart 2).

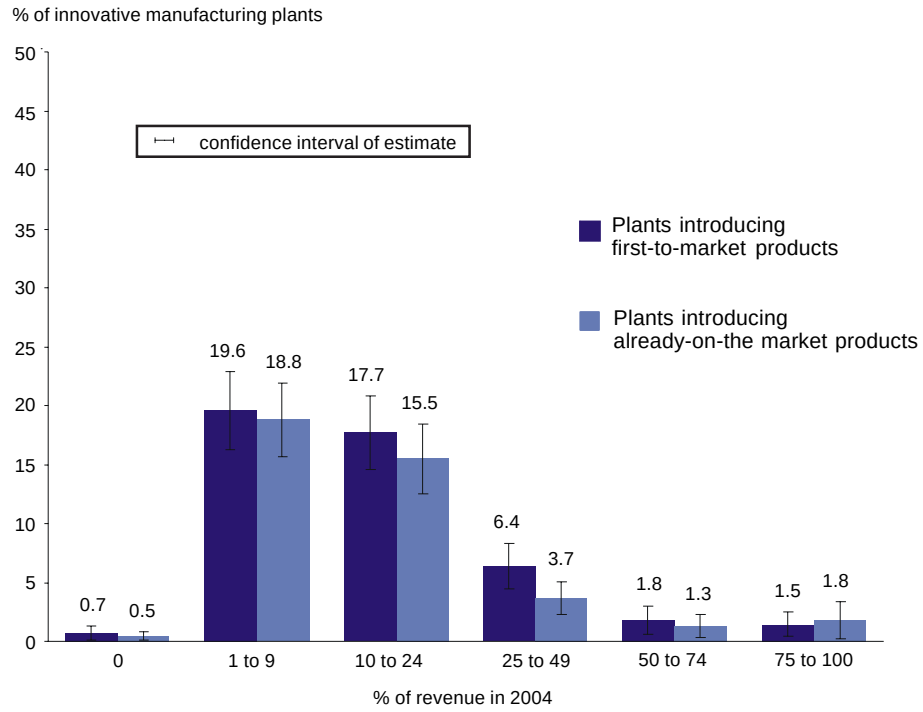
Among the one in two (47.7%) innovative plants that introduced a new product to market before their competitors from 2002 to 2004, these product innovations accounted for an average of 16.1% of the plants' revenues in 2004. Among the four in ten (41.5%) innovative plants that introduced a new product to market that was already available from their competitors, these product innovations made up an average of 15.3% of the plants' revenues in 2004.

Summary

This article has shed some light on commercialization activities of innovative plants. According to the Survey of Innovation 2005, at least two-thirds of innovative manufacturing plants engaged in an activity related to the commercialization of their product innovation during the years 2002 to 2004. Four out of five (84.0%) innovative manufacturing plants engaged in activities for the market introduction of their innovations, and two-thirds (66.5%) of innovative plants undertook activities to assure the commercial success of their innovations.

Whether or not product innovations were already available from a plant's competitor did not appear to impact on the percentage of revenues from these innovations. About one-sixth of an innovative plant's total revenues in 2004 came from their product innovations introduced from 2002 to 2004.

Chart 2
Percentage of innovative plants with revenues in 2004 from product innovations introduced to market before competitors and product innovations that were already available from competitors during the three years, 2002 to 2004



Source: Statistics Canada, Survey of Innovation, 2005.

A new survey, the Survey on the Commercialization of Innovation, 2007 was carried out in late 2007 and early 2008. It collected information from small and medium-sized innovative manufacturing firms on the following: commercial performance in marketing reported for the most significant and recent product innovation; strategic commercialization activities; financial activities for commercialization; cooperative agreements on commercialization; intellectual property; general information; and profile of entrepreneurs. Results are expected to be available in the fall of 2008.

Notes

1. Organisation for Economic Co-operation and Development and Eurostat, 1997, *Oslo Manual*, 2nd edition: *Proposed Guidelines for Collecting and Interpreting Innovation Data,* Paris. These guidelines were adopted for the Survey of Innovation 2005.

2. As the sample drawn for the Survey of Innovation 2005 was only one of many possible samples that could have been drawn using probability sampling methods, a sampling error can be attributed to each estimate. Standard errors combined with imputation rates have been used to provide a guide as to the reliability of percent estimates. The System for Estimating Variance due to Non-response and Imputation program (SEVANI) was used to complete these calculations. For the Survey of Innovation 2005, a 95% confidence interval was used in the probability sample scheme.

Susan Schaan, SIEID, Statistics Canada

The transmission of technology and knowledge to innovative Canadian manufacturing firms

In its recently released science and technology (S&T) strategy, *Mobilizing Science and Technology to Canada's Advantage* (Government of Canada 2007), the federal government stated its commitment to improve its ability to measure and report on the impact of federal S&T expenditures. In response to this challenge, the Policy Research Initiative (PRI) collaborated with departments and agencies that conduct and fund S&T to explore these issues. This article provides a summary from one of the PRI reports, *The Transmission of Technology and Knowledge to Innovative Manufacturing Firms by Publicly Funded Research Organizations*.

Background

Released in May 2008, the PRI report (Anderson 2008) used international metrics developed by the OECD (OECD/Eurostat 1997) and data from the 2005 Canadian Survey of Innovation in manufacturing (Statistics Canada 2006) to examine publicly funded research organizations[1] and how they transmit knowledge and technology to innovative Canadian manufacturing firms, with a view to contributing to the discussions on measuring the impact of federal S&T expenditures.

The measurement of linkages between publicly funded research organizations and innovative manufacturing firms represents only one aspect of the impact of publicly funded research organizations. The broader Policy Research Initiative project is examining measurement issues related to the wide range of impacts that publicly funded research organizations have on both the economy and society.

The Statistics Canada Survey of Innovation 2005 surveyed 8,902 Canadian manufacturing establishments with at least 20 employees and at least $250,000 in revenues. Firms were asked to indicate whether they introduced a new product (good or service) or process during the three-year period covered by the survey (2002 to 2004). Based on responses to these questions, firms were classified as innovators or non-innovators. An innovative firm is one that introduced a new product or process during the survey period. The report analyzes innovative firms. Two-thirds (65.0%) of all firms were found to be innovative. The Survey of Innovation 2005 included questions that provide data for the development of indicators of in-bound diffusion. For more information on the survey, please see: http://www.statcan.ca/english/sdds/4218.htm

Summary of survey results

Publicly funded research organizations such as universities and government research laboratories can serve the public interest by directly and indirectly helping other organizations to advance public policy goals.

The results indicate that while these organizations play a comparatively small direct role in supporting the introduction of new products and processes in most sectors, they are helping to realize a variety of objectives.

According to the survey, each of universities and federal and provincial labs were significantly less likely to be identified as an important source of information by innovative firms than were customers; suppliers; conferences, trade fairs and exhibitions; competitors; the Internet; scientific journals and trade/technical publications; industry associations; consultants; and experienced risk takers or entrepreneurs. In addition, innovative firms were significantly more likely to collaborate with other firms than with publicly funded research organizations.

However, the results vary across industries, with innovative firms in several natural resource processing and machinery and equipment sectors, as well as the aerospace sector, being significantly more likely to rate publicly funded research organizations as highly important information sources, and to collaborate with and acquire licences from them.

The one-in-ten innovators that were most strongly linked[2] to publicly funded research organizations were more likely to be larger, have employees with university degrees and employees engaged in R&D, conduct a wider range of innovation activities, collaborate with other public and private organizations, and receive funding from government and from non-conventional private sources.

The innovative firms that were most strongly linked to publicly funded research organizations were significantly more likely to indicate that their innovations had a highly important impact on improving health and safety, reducing environmental impacts, meeting regulatory requirements, reducing materials or energy per unit output, and improving the quality of jobs.

Notes

1. For this study, publicly funded research organizations include universities or other higher education institutions, federal government research laboratories, and provincial/territorial government research laboratories.

2. Strongly linked innovators are considered to be those innovators that possess at least one of three in-bound diffusion characteristics with a publicly funded research organization: collaboration, licensing, or source of information of high importance.

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Anderson, Frances. 2008. *The Transmission of Technology and Knowledge to Innovative Canadian Manufacturing Firms by Publicly Funded Research Organizations*, Government of Canada Policy Research Initiative, Working Paper Series 036, May.

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Rad Joseph and Frances Anderson, SIEID, Statistics Canada

What's new?

Read about recent releases, updates and new activities in the areas of information and communications technology, and science and technology.

Information and communications technology

Internet use by individuals

The 2007 Canadian Internet Use Survey (CIUS) was conducted in October and November 2007. Data on Internet use were released in The Daily on June 12, 2008, followed by Internet shopping data on November 17, 2008.

Outreach activities that demonstrate the relevance and analytical potential of CIUS data are ongoing. These include:

- A series of presentations on the results of the 2007 CIUS, including to the survey's federal partners (Industry Canada, Service Canada, Treasury Board, Canadian Heritage), and to the Rural Development Network of the Rural Secretariat;
- A presentation to the *Netspeed 2008* conference in Edmonton, Alberta, as well as to the Alberta government; plans to visit other provincial governments are underway.
- A presentation on the diffusion of the Internet at the 55th Annual North American Meetings of the Regional Science Association International.

A number of analytical studies are underway. They are grouped under two themes: Internet privacy and security and online shopping; and online participation and social impacts.

A study of Internet use and social cohesion, based on several sources, is forthcoming in the *Connectedness Series* (Catalogue no. 56F0004M).

Business and government Internet use

Trends in e-commerce, including 2007 results from the Survey of Electronic Commerce and Technology (SECT), were presented at the International Association for Development of the Information Society Conference 2008 in Amsterdam, the Netherlands.

Telecommunications

Annual survey of telecommunications service providers

The 2006 statistics for the telecommunication services industries were released on September 2, 2008 in *Broadcasting and Telecommunications* (56-001-X, Vol. 38, no. 1, free).

This is the final issue of this publication in its current form. The Annual Survey of Telecommunications was merged with a similar data collection undertaken by the Canadian Radio-Television and Telecommunications Commission (CRTC). Selected results from the first cycle of the joint survey were released by the CRTC in their *Communications Monitoring Report 2008* (www.crtc.gc.ca). Summary results will be published by Statistics Canada at a later date.

Quarterly survey of telecommunications service providers

The processing and analysis of the 2007 and 2008 data from the redesigned survey is on-going. The first release is planned for early in 2009.

Broadcasting

Annual surveys of the radio, television and cable industries

The 2007 statistics for the television and radio industries were released on July 8 and August 25, 2008 in The Daily. In both cases the releases were accompanied by a more detailed publication, they are *Television Broadcasting Industries, 2007* (56-207-X, free) and *Radio Broadcasting Industry, 2007* (56-208-X, free).

The processing of 2007 data for the program distribution industry is on-going. The next release is planned for November 27, 2008.

Science and Technology activities

Research and development in Canada

No updates to report.

Industrial research and development

The service bulletin 'Industrial research and development, 2004 to 2008' (Catalogue no. 88-001-X, Vol. 32, no. 5) was released on September 5, 2008.
http://www.statcan.ca/english/freepub/88-001-XIE/88-001-XIE2008005.htm.

Federal science expenditures

No updates to report.

Higher education sector research and development

The service bulletin 'Estimation of research and development expenditures in the higher education sector, 2006/2007' (Catalogue no. 88-001-X, Vol. 32, no. 4) was released on August 14, 2008.
http://www.statcan.ca/english/freepub/88-001-XIE/88-001-XIE2008004.htm.

Human resources and intellectual property

No updates to report.

Federal science expenditures and personnel, intellectual property management annex

No updates to report.

Intellectual property commercialization in the higher education sector

No updates to report.

Innovation

Innovation in manufacturing

Tables presenting results from the Survey of Innovation 2005 are now available on CANSIM (Tables 358-0062 to 358-0117). Custom requests for non-standard tables are being produced.

Analysis of the micro-data of the Survey of Innovation 2005 by external facilitated access researchers continues. The OECD sponsored project to study the relation between innovation and productivity in selected OECD countries is wrapping up with first results to be published soon.

Estimates from the Survey of Innovation 2005 were incorporated into the OECD's Science and Technology Indicators Scoreboard 2007.

Innovation in advanced technologies in manufacturing and logging

First results from the Survey of Advanced Technology 2007 were released on June 26, 2008. This survey of advanced technology use sent to almost 9,500 manufacturing plants and about 370 logging operations shows that almost all (92%) manufacturing plants and more than half of logging operations (58%) currently use at least one advanced technology. More than two-thirds (69%) of manufacturing plants and about one in five logging operations (18%) currently use at least five advanced technologies.

A follow-up to the Survey of Advanced Technology 2007 examined plants that modify or create technologies. First results will be available in early Fall 2008.

Innovation in advanced technologies in mining

Lack of funding has resulted in the cancellation of this survey.

Community Innovation

No updates to report.

Commercialization

Preliminary results for the 2007 Survey of Business Incubation were released in The Daily on August 27, 2008.

Emerging Technologies

Functional Foods and Natural Health Products

The Functional Foods and Natural Health Products Survey, undertaken in partnership with Agriculture and Agri-Food Canada, is currently in progress and data are expected to be released in early 2009.

Knowledge management practices

Knowledge Transfers between Canadian Business Enterprises and Universities: Does Distance Matter?

This study examines whether the transfer of knowledge flows from universities to enterprises in Canada is hampered by the geographical distance that separates them. The transfer of knowledge flows are measured by the amount of R&D payments from business enterprises to universities that are directly reported in Statistics Canada's survey on Research and Development in Canadian Industry. Data from the 1997 to 2001 surveys were used.

After controlling for unobserved individual heterogeneity, selection bias as well as for other covariates that could affect the extent of industry-university R&D transactions such as absorptive capacity, foreign control, belonging to the same province, past experience with a given university and other firm and university characteristics, it is found that a 10% increase in distance decreases the proportion of total R&D paid to a university by 1.4% for enterprises that report tacit transfer of knowledge flow, and by 0.7% for enterprises that report codified knowledge flows.

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New economy indicators

We have compiled some of the most important statistics on the new economy. The indicators will be updated, as required, in subsequent issues. For further information on concepts and definitions, please e-mail sieidinfo@statcan.gc.ca.

Table 1a
General economy and population

	2001	2002	2003	2004	2005	2006	2007
Gross Domestic Product (GDP) ($ millions)	1,108,048	1,152,905	1,213,175	1,290,906	1,372,626	1,450,490	1,535,646
GDP implicit price index (2002=100)	98.9	100.0	103.3	106.6	110.2	112.9	116.4
Population (thousands)	31,021	31,373	31,676	31,995	32,312	32,649	32,976

Source: Statistics Canada, 2008, Canadian Economic Observer, Catalogue no. 11-010-XWB, CANSIM Tables 380-0056, 051-0001.

Table 1b
Gross domestic expenditures on research and development (GERD)

	2001	2002	2003	2004	2005	2006	2007
GERD ($ millions)	23,132	23,532	24,635	26,480	27,699	28,067	28,984
"Real" GERD ($ millions 2002)	23,389	23,532	23,848	24,841	25,135	24,882	..
GERD/GDP ratio	2.09	2.04	2.03	2.05	2.01	1.94	1.89
"Real" GERD per capita ($ 2002)	753.97	750.07	752.87	776.40	777.88	762.11	..
"Real" federal performance of research and development ($ millions 2002)	2,126	2,190	2,016	1,954	2,191	2,037	2,009
GERD funding by sector				**% of GERD**			
Federal government	17.7	18.1	18.4	17.6	18.9	18.8	18.8
Provincial governments	4.5	5.0	5.6	5.3	4.9	5.1	5.1
Business enterprise	50.2	51.4	50.2	49.4	48.5	48.0	47.8
Higher education	12.7	14.7	14.6	15.7	15.7	16.2	16.4
Private non-profit	2.3	2.7	2.6	2.8	2.8	2.9	2.9
Foreign	12.6	8.2	8.7	9.4	9.2	9.1	9.0
GERD performance by sector							
Federal government	9.1	9.3	8.5	7.9	8.7	8.2	8.1
Provincial governments	1.2	1.2	1.1	1.1	1.1	1.1	1.1
Business enterprise	61.7	57.5	57.0	56.4	55.4	54.7	54.4
Higher education	27.8	31.7	33.1	34.2	34.4	35.5	36.0
Private non-profit	0.3	0.3	0.4	0.4	0.4	0.4	0.4
Federal performance as a % of federal funding	51.3	51.5	46.0	44.8	46.0	43.6	43.0

Source: Statistics Canada, CANSIM Table 358-0001 "Gross domestic expenditures on research and development, by science type and by funder and performer sector, annual".

Table 1c
Information and communications technology (ICT) sector

	2001	2002	2003	2004	2005	2006
ICT sector contribution to GDP[1]						
ICT, manufacturing ($ millions 1997)	11,069	8,619	9,239	9,516	10,261	10,702
% of total ICT sector	20.6	15.9	16.1	16.0	16.5	16.5
ICT, services ($ millions 1997)	42,349	44,982	47,522	49,037	51,325	53,511
% of total ICT sector	78.6	82.9	82.7	82.7	82.3	82.3
Total ICT sector ($ millions 1997)	53,857	54,288	57,482	59,298	62,359	65,019
Total economy GDP ($ millions 1997)	957,258	982,843	1,002,936	1,034,024	1,062,951	1,091,587
ICT as a % of total economy	5.6	5.5	5.7	5.7	5.9	6.0
Total business sector GDP ($ millions 1997)	808,810	831,293	847,701	875,777	902,519	927,564
ICT as a % of business sector	6.7	6.5	6.8	6.8	6.9	7.0

1. Data are in basic prices using chained-Fisher methods of deflation (1997 chained dollars), CANSIM Tables 379-0017 "Gross Domestic Product (GDP) at basic prices, by North American Industry Classification System (NAICS), annual" and 379-0020 "GDP at basic prices, special industry aggregations based on NAICS, annual", www.statcan.gc.ca.

Sources: Statistics Canada, Gross Domestic Product by Industry (National) (Annual and Monthly) (various years).

Table 1d
Information and communications technology (ICT) access and use

	2001	2002	2003	2004	2005	2006	2007
ICT adoption rates (private sector)				% of enterprises			
Personal computer	83.9	85.5	87.4	88.6	..	..	..
E-mail	66.0	71.2	73.8	76.6	76.2	77.5	81.1
Internet	70.8	75.7	78.2	81.6	81.6	82.8	86.7
Have a website	28.6	31.5	34.0	36.8	38.3	39.7	41.4
Use the Internet to purchase goods or services	22.4	31.7	37.2	42.5	43.4	44.8	48.5
Use the Internet to sell goods or services	6.7	7.5	7.1	7.4	7.3	8.0	8.2
Value of sales over the Internet ($ millions)	10,389	13,339	18,598	26,438	36,268	46,492	58,235
ICT adoption rates (public sector)							
Personal computer	100.0	99.9	100.0	100.0	..	..	..
E-mail	99.7	99.6	99.8	99.9	99.6	99.9	100.0
Internet	99.7	99.6	100.0	99.9	99.6	99.9	99.9
Have a website	86.2	87.9	92.7	92.4	94.9	94.4	93.2
Use the Internet to purchase goods or services	54.5	65.2	68.2	77.4	82.5	79.5	82.1
Use the Internet to sell goods or services	12.8	14.2	15.9	14.0	15.2	15.9	15.9
Value of sales over the Internet ($ millions current)	354.8	327.2	511.4	1,881.5	2,924.7	3,424.3	4,450.0
ICT adoption rates (individuals aged 18 years and over)[1]				% of individuals			
Personal (non-business) Internet use from any location	..	..	..	..	67.9	..	73.2
Personal (non-business) Internet use from home	..	..	..	..	60.9	..	68.6
Use the Internet to order or purchase goods or services (% of Internet users)	..	..	..	..	41.1	..	43.7
Total value of e-commerce orders or purchases ($ billions)	..	..	..	..	7.9	..	12.8
Average value of e-commerce orders or purchases (dollars per consumer)	..	..	..	..	1,150	..	1,520

1. Target population has changed from individuals 18 years of age and older in 2005 to individuals 16 years of age and older in 2007.

Sources: Statistics Canada, Canadian Internet Use Survey; Survey of Electronic Commerce and Technology.

Table 1e
Telecommunications services indicators

	2001	2002	2003	2004	2005	2006	2007
Teledensity indicators				**per 100 inhabitants**			
Wired access – Voice Grade Equivalent (VGE)	67.9	65.5	64.9	64.1	64.1	64.1	63.1
Wireless access (VGE)	34.7	38.1	41.8	46.8	52.5	57.2	61.3
Total public switched telephone network (PSTN)(VGE)	102.5	103.6	106.7	110.9	116.6	121.4	124.4
				thousands			
Homes with access to cable	11,068.6	11,378.9	11,694.4	11,908.2	12,113.2	12,484.3	...
Homes with access to Internet by cable	9,339.3	10,046.0	10,685.9	11,124.2	11,517.9	11,968.6	...
Access indicators							
Total wired access lines (VGE)	21,126.0	20,622.0	20,612.0	20,563.0	20,780.0	21,000.0	20,876.0
Residential access lines (VGE)	12,920.0	12,913.0	12,886.0	12,891.0	12,900.0	12,950.0	12,906.0
Business access lines (VGE)	8,206.0	7,709.0	7,726.0	7,672.0	7,880.0	8,050.0	7,970.0
Total mobile subscribers	10,800.0	11,997.0	13,291.0	15,020.0	17,016.6	18,749.1	20,277.4
Digital cable television subscribers	808.4	1,146.5	1,403.9	1,810.5	2,283.1	2,777.2	...
Satellite and multipoint distribution system subscribers	1,609.2	2,018.6	2,205.2	2,324.6	2,491.5	2,628.7	...
Total residential Internet subscribers	...	6,547.0	7,013.0	7,442.0	7,997.0	8,700.0	9,290.0
Total dial-up Internet subscribers	...	3,020.0	2,500.0	2,025.0	1,568.0	1,239.0	934.0
Total residential high-speed subscribers	...	3,527.0	4,513.0	5,416.0	6,429.0	7,461.0	8,356.0
High speed Internet by cable subscribers	1,624.0	2,055.0	2,532.0	2,933.0	3,467.0	4,041.0	4,573.0
High speed Internet - Other	...	1,472.0	1,981.0	2,483.0	2,962.0	3,420.0	3,783.0
Investment indicators							
Investments by the telecommunications services industries (NAICS 517) ($ millions current)	10,652.9	9,080.5	6,901.1	8,251.0	7,910.8	7,655.9	8,013.4
Investments by the telecommunications services industries (NAICS 517) ($ millions constant)	10,621.4	9,080.5	7,392.4	9,351.0	9,318.4	9,482.8	10,816.8

Sources: Statistics Canada, Telecommunications statistics (various years), CRTC Telecommunications Monitoring report, July 2007, CRTC Communications Monitoring report 2008.

Table 1f
Characteristics of biotechnology innovative firms

	2001	2002	2003	2004	2005
			number		
Firms	375	..	496	..	532
Total biotechnology employees	11,897	..	11,931	..	13,433
Firms that were successful in raising capital	134	..	178	..	173
Existing patents	4,661	..	5,199	..	3,849
Pending patents	5,921	..	8,670	..	7,038
Products on the market	9,661	..	11,046[E]	..	2,438
Products/processes in pre-market stages	8,359	..	6,021	..	F
			$ millions		
Total biotechnology revenues	3,569	..	3,820	..	4,191
Expenditures on biotechnology research and development	1,337	..	1,487	..	1,703
Export biotechnology revenues	763	..	882	..	792[E]
Import biotechnology expenses	433	..	422[E]	..	689[E]
Amount of capital raised	980	..	1,695	..	1,350

Source: Statistics Canada, Biotechnology Use and Development Survey (various years).

Table 1g
Intellectual property (IP) commercialization

	2001	2002	2003	2004	2005
Federal government					
Number of new patents received	133	142	178	169	108
Royalties on licenses ($ millions)	16.3	15.5	14.9	15.2	17.2
Universities and hospitals					
Number of new patents received	381	..	347	397	376
Income from intellectual property ($ millions)	52.5	..	55.5	51.2	55.2

Sources: Statistics Canada, Federal Science Expenditures and Personnel Survey, and Survey of Intellectual Property Commercialization in the Higher Education Sector (various years).