Catalogue no. 88F0006XIE — No. 018
ISSN: 1706-8967
ISBN: 0-662-38480-6

Working Paper

Science, Innovation and Electronic Information Division working papers

Public Sector Technology Transfer in Canada, 2003

By Michael Bordt and Louise Earl

Science, Innovation and Electronic Information Division (SIEID)
7-A, R.H. Coats Building, Ottawa, K1A 0T6

Telephone: 1 800 263-1136

This paper represents the views of the authors and does not necessarily reflect the opinions of Statistics Canada.

Statistics Canada Statistique Canada

Canada

Contacts for more information

Science, Innovation and Electronic Information Division

Director Dr. F.D. Gault (613-951-2198)
Assistant Director Craig Kuntz (613-951-7092)

The Science and Innovation Information Program

Special Advisor, Science and Technology

Dr. Frances Anderson (613-951-6307)

Chief, Knowledge Indicators

Michael Bordt (613-951-8585)

Special Advisor, Life Sciences

Antoine Rose (613-951-9919)

Science and Innovation Surveys Section

Chief, Science and Technology Surveys

Antoine Rose (613-951-9919)

FAX: (613-951-9920)

E-Mail: Sieidinfo@statcan.ca

Working Papers

The Working Papers publish research related to science and technology issues. All papers are subject to internal review. The views expressed in the articles are those of the authors and do not necessarily reflect the views of Statistics Canada.

Public Sector Technology Transfer in Canada, 2003

Michael Bordt and Louise Earl,
Science, Innovation and Electronic Information Division
Statistics Canada

How to obtain more information:
National inquiries line: 1 800 263-1136
E-Mail inquiries: infostats@statcan.ca

November 2004

88F0006XIE2004018
ISSN: 1706-8967
ISBN: 0-662-38480-6

Symbols

The following standard symbols are used in Statistics Canada publications:

. 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

Note: Due to rounding, components may not add to totals

Note of appreciation
Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

Public Sector Technology Transfer in Canada, 2003

Michael Bordt and Louise Earl, SIEID, Statistics Canada

Of the approximate $22 billion (Thompson, 2004) of R&D performed in Canada in 2003, about 10% is performed by the federal government and 35% by universities. To better understand the degree to which the research is commercialized, Section "D" of the Survey of Electronic Commerce and Technology (SECT), 2003 was used to collect information on the transfer of technology from Canadian universities, hospitals and federal government labs to the private and public sectors. The survey also asked organizations whether or not they were spun-off from Canadian universities.

It was estimated that about 3,000[1] firms found that the acquisition of technology from a Canadian university played a major role in their inception or growth (Chart 1). About 1,930 firms suggested that technology acquired from Canadian hospitals and for a further 700 firms, technology acquired from federal government labs, played major roles in their growth or inception.

In total, over 4,400 firms found that technology from one or more of these sources played a major role in their success.

It was estimated that about 1,400 firms licensed technologies[2] from universities over the past 3 years; about 1,670 licensed from hospitals and 1,400 licensed from federal government labs (Chart 1). In total, 4,120 firms had licensed from one of these sources. Approximately 1,350 firms considered themselves as spin-offs from Canadian universities.

These numbers appear small given that the Canadian economy is comprised of almost 2 million businesses[3]. Analysis of the previous year's SECT Section "D" on technological acquisition puts these numbers into context. Although over 40% of organizations experienced technological change, only one in five of these acquired their technologies through licensing (Earl, 2004)—the others used alternate means to acquire their technologies including purchasing their technologies off-the-shelf. That implies that only about 8% of organizations license technology from any source.

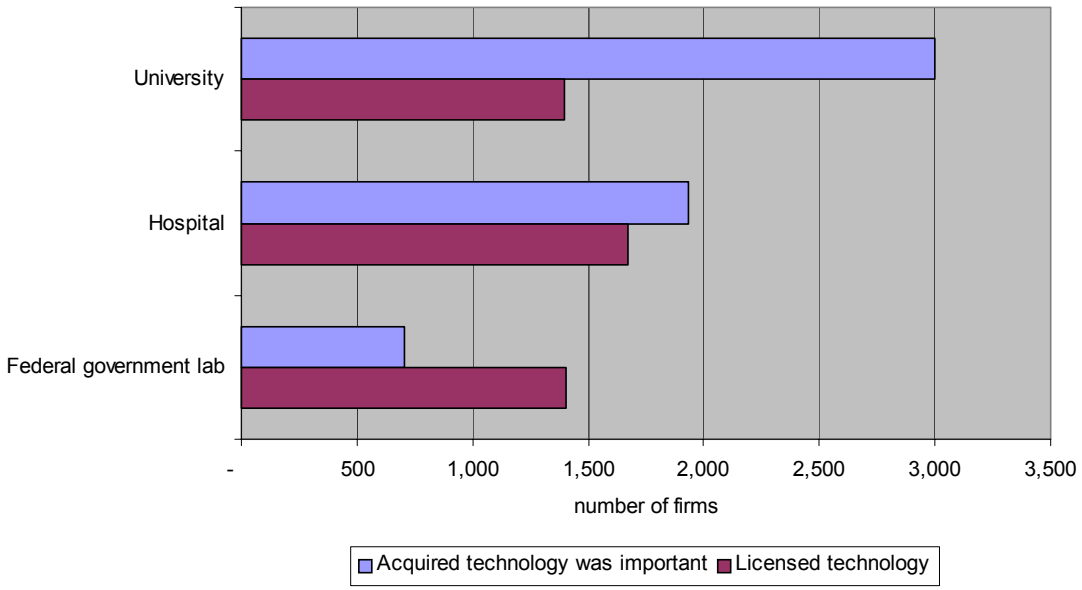
---

1. Data in this release are from the 2003 Survey of Electronic Commerce and Technology (SECT), which included the entire economy, except for local governments. The survey covered about 21,000 enterprises. The data collected are generally based on categorical variables, numbers are usually reported in terms of percentages (of all businesses or of a given industry sector). Since technology transfer from these sources is a rare event (less than 1% overall), we are reporting approximate overall numbers and percentages of those when discussing industry sectors. These estimates could therefore be slightly higher or lower than an actual census count.

2. Excluding software licenses of less than $1,000.

3. Of the almost 2 million businesses, approximately one million have full-time employees. SECT excludes smaller units whether they have employees or not. The target population for SECT is around 675,000 enterprises.

Chart 1. The importance of technology acquired and licensing, 2003



Source: Statistics Canada, 2003, Survey of Electronic Commerce and Technology 2003. Science, Innovation and Electronic Information Division.

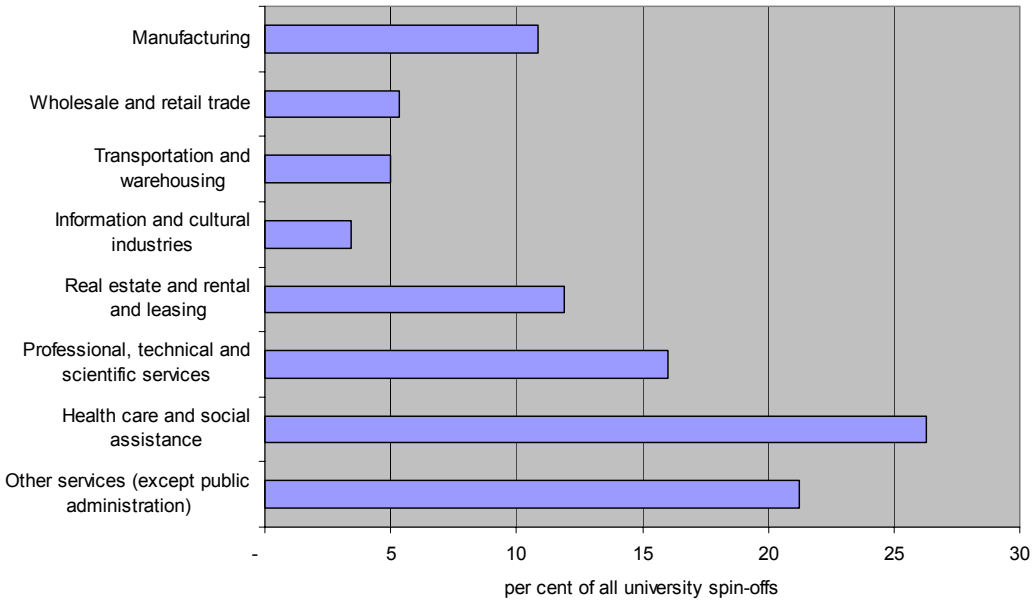
Technology transfer

There are many means of acquiring technologies. Universities, hospitals and government labs tend to license out technologies they have patented, spin-off companies to further develop a technology or make their research findings freely available in the form of scientific publications. Within the private sector, the most popular method of acquiring technologies, according to the Survey of Electronic Commerce and Technology, 2002 was making off-the-shelf purchases. Four-fifths of private sector firms used this method to acquire new technologies with all industry sectors participating. On the other hand, licensing new technologies was a technology acquisition method undertaken by just one-fifth of private sector firms, again across the economy with the intangible services showing the most interest in licensing (Earl, 2004).

About 700 companies noted that technology acquired from federal government labs was important to their inception or growth. More than four times that number noted that technology acquired from universities (about 3,000) was important. This difference could be related to the number, width and accessibility of technology transfer channels. Universities and research hospitals for example, not only license and spin-off companies, they also publish vast numbers of scientific papers, consult, and engage in research contracts. While federal government labs also license technologies to the private sector, they are less likely to spin off companies (Bordt, 2004) and engage in research contracts.

Licensing technologies from the three sources was more evenly distributed. Of the three sources, more firms licensed from Canadian hospitals (about 1,670) than universities or federal government labs (about 1,400 each). This observation contrasts with results of the most recent Survey of Intellectual Property Commercialisation in the Higher Education Sector, 2001 (SIPCHES 2001) (Read, 2003), which indicates that university-affiliated hospitals executed a small number of licenses (86) compared to the universities (1,338). One possible explanation is that many of the technologies that the firms reported having licensed from hospitals were not developed at those hospitals.

Chart 2. Distribution of university spin-offs by industry sector, 2003



Source: Statistics Canada, 2003, Survey of Electronic Commerce and Technology 2003. Science, Innovation and Electronic Information Division.

Spin-offs

The number of spin-offs represents almost twice the figure recorded from SIPCHES 2001[4]. There are significant differences in definitions and about how the data are collected between the two surveys. SIPCHES requires a spin-off to have an administrative link with the university: it was created to license the institution's technology, to fund research at the institution in order to develop technology that will be licensed by the company or to provide a service that was originally offered through an institution's department or unit.

4. SIPCHES reports a total of 680 cumulative spin-offs, 384 of which are considered active. Given that all the 1,350 reported in SECT 2003 are active, the ratio increases to over 3.5 times.

While the data show differences in the counts of university spin-offs, what is most interesting is the proportional distribution of university spin-offs through the economy (Chart 2). Of the 19 industrial sectors in the private sector, just one-half (10 sectors) had any university spin-offs. In two sectors, the numbers were so small, they were combined with other sectors for reporting.

According to Survey of Electronic Commerce and Technology 2003, about one-quarter of university spin-offs were health care and social assistance firms, followed by firms in other services (except public administration) combined with administrative and support, waste management and remediation services at one-fifth of university spin-offs. Firms in professional, scientific and technical services comprised 16% of the spin-offs. About a one-tenth were in both real estate and rental and leasing and in manufacturing. Finally wholesale and retail trade; transportation and warehousing, and information and cultural industries comprised the remaining 14%.

Within the health care and social assistance sector, university spin-offs were mainly concentrated in ambulatory health care services (44%) which includes offices of physicians, dentists, out-patient care centres, and medical and diagnostic laboratories as well as in social assistance (36%) which includes such activities as child day-care services, family services and vocational rehabilitation services. This healthcare orientation of university spin-offs is also seen in the manufacturing where one-quarter of university spin-offs did work in pharmaceutical and medicine manufacturing. Another one-quarter of the university spin-off firms in manufacturing worked in computer and electronic product manufacturing, the vast majority of which specialised in semiconductor and other electronic component manufacturing. A further one-tenth was in basic chemical manufacturing. Finally, the largest proportion of the manufacturing spin-offs was comprised of miscellaneous manufacturers: 37%. This North American Industry Classification System (NAICS) 2002 (Statistics Canada, 2002) code contains medical equipment and supplies manufacturing which includes the manufacture of laboratory type equipment, contact lenses, and orthopaedic devices. Other manufacturing activities include the making of jewellery and silverware, and sporting and athletic goods equipment.

The one-fifth of university spin-offs in “other services” were concentrated in personal and laundry services and religious, grant-making, civic and professional and similar organisations. Within personal and laundry services are coin-operated laundry services and dry cleaners and parking lots and garages. This may be explained by a broad interpretation of the definition of spin-off which includes “or to provide a service that was originally offered through an institution’s department or unit”. Although this definition was not given on the SECT 2003 questionnaire, it may be that many small firms providing services to the university consider themselves spin-offs.

Grant-making and giving services and social advocacy organisations are the main components of religious, grant-making, civic and professional and similar organisations and the fact that universities are creating companies to look after grant-making and giving may indicate the level of interest that universities have in fund-raising.

The university spin-offs in professional services were evenly divided between management, scientific and technical consulting services and scientific research and development services. Management, scientific and technical consulting services comprise management consulting services and environmental consulting services. Scientific research and development services include research and development in physical, engineering and life sciences as well as in the social sciences and humanities.

All of the university spin-offs in wholesale trade were in building material and supplies wholesaler-distribution whereas the retail trade spin-offs were in sporting goods, hobby and musical instrument stores. Within the administrative and support sector, all of the university spin-offs undertook employment services. Finally, returning to the theme of information and communication technologies, university spin-offs in information and cultural industries were concentrated in software publishing.

It appears that university spin-offs reporting in Survey of Electronic Commerce and Technology 2003 follow the industry distribution implied by the definition in SIPCHES 2001: they are either associated with operations of the higher educational institutions such as offering employment services of looking for grant-making opportunities or fuelled by the research undertaken within the academic setting or offering the skills and expertise of created within the university environment to the market place. The spin-offs appear to be natural and complementary activities to the work done within academic settings.

Conclusions

This is a first Canadian attempt to view the impacts of federally-funded research from the perspective of the whole economy. Despite the fact that technology transfer from public sources is a rare event, the number of transfers reported on the business side is much higher than those previously reported by the public institutions. This may be because businesses have a broader interpretation of licensing and spinning-off than do universities and federal labs.

While firms are equally likely to license from universities, hospitals and federal labs, technology acquired from universities has had a major impact on many more companies than technology acquired from federal labs. A more focussed survey of business commercialization activities would be required to obtain more detail on the distribution and magnitude of the impacts.

References

Bordt, Michael, 2004, *Commercialization in Canadian federal science-based departments and agencies, 2002-03*, Innovation Analysis Bulletin, Vol. 6 No. 2 (June 2004), Statistics Canada Cat. No. 88-003-XIE.

Earl, Louise. 2004. *Starting the new century: technological change in the Canadian private sector, 2000-2002*. SIEID Working Paper, Statistics Canada Cat. No. 88F0006XIE2004001.

Read, Cathy, 2003, *Survey of intellectual property commercialization in the higher education sector, 2001*, SIEID Working Paper, Statistics Canada Cat. No. 88F0006XIE2003012.

Statistics Canada, 2002, *The North American Industry Classification System*, Catalogue No. 12-501-XIE.

Statistics Canada, 2003, Survey of Electronic Commerce and Technology 2003, SIEID. Questionnaire available on the Internet at www.statcan.ca.

Thompson, Janet, 2004, *Estimates of Canadian research and development expenditures (GERD), Canada, 1992 to 2003^{p}, and by province 1992 to 2001*, SIEID working paper series, Catalogue No. 88F0006XIE2004003.