



# Publication

## POLICY PERSPECTIVES

Vol. 14 No. 1 – February 2007

Editor: Jock A. Finlayson

### PROFILE OF THE BRITISH COLUMBIA INFORMATION & COMMUNICATIONS TECHNOLOGIES SECTOR

Since the 1970s, the information and communications technologies sector (ICT) has grown to occupy a prominent place in both the Canadian and BC economies. The sector is now rebounding from the painful downturn it experienced in the early years of the decade. Within Canada, sizable ICT clusters have emerged in Vancouver, Toronto, Ottawa and Montreal. This issue of Policy Perspectives takes a closer look at the ICT sector, with a particular focus on British Columbia.

#### Scope and Growth of the Canadian ICT Sector

In Canada, the ICT sector is characterised by a range of typically specialised, preponderantly small companies engaged in one of three lines of business: manufacturing, services, and wholesaling/renting/ leasing (see Box 1).<sup>1</sup> The sector is comprised of roughly 32,000 companies, 80% of which employ fewer than 10 people. About 15% of Canadian ICT firms have 10 to 49 workers, 2.7% have 50-100 employees, and just 2.5% employ more than 100 workers.

ICT is one of the bright lights in Canada's economy. Overall Canadian ICT sector revenues reached \$136 billion in 2005, up 3.2% from 2004.<sup>2</sup> Since 1997, the sector's revenues have been growing at an average annual rate of 4.2%. About 16% of its revenues come from ICT manufacturing, 56% from services, and the rest from wholesaling, rental and leasing. Nationally, ICT manufacturing revenues have

Box 1  
**ICT SECTOR INDUSTRIES**  
(based on NAICS definitions)

**ICT Manufacturing**

- Computer Equipment Mfg
- Communications Equipment Mfg (including wired & wireless)
- Electronic Component Mfg
- Audio and Video Equipment Mfg
- Instruments Mfg
- Communication Wire and Cable Mfg
- Commercial Industry Machinery Mfg

**ICT Services**

- Software and Computer Services (software publishers, computer systems design, and data processing)
- Telecommunications Services
- Cable and Other Program Distribution

**ICT Wholesaling, Rental and Leasing**

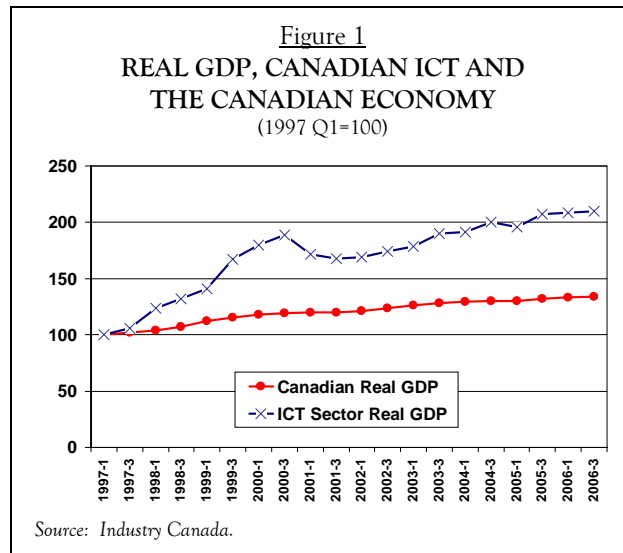
Source: Industry Canada.

<sup>1</sup> Industry Canada's definition of the ICT sector is followed here. It is based on the North American Industry Classification System (NAICS).

<sup>2</sup> Information and Communications Technologies (ICT) Branch, Industry Canada, Canadian ICT Sector Profile (October 2006).



been on a downward trend since 2000, although they appear to have stabilized in the past two years. Revenue growth has been strongest in the services segment of the ICT sector, which has seen a doubling of revenue since 1997. Employment in Canadian ICT firms has recovered since the early part of the decade, climbing by almost 4% in 2005, much better than the 1.9% gain recorded the year before. The ICT sector provided 3.6% of all Canadian jobs (589,000) in 2005, and contributed almost 6% to the nation's GDP. Output (real GDP) growth in the sector has averaged 8.4% since 1997, more than double the rate for the economy as a whole.<sup>3</sup>



### The BC Industry in a National Context

Since 1997, British Columbia's ICT sector has outpaced the rest of the country in several areas – the growth of computer/electronic products manufacturing revenue, software and computer services revenue, aggregate industry employment, and R&D spending.<sup>4</sup> BC has also outperformed all other regions except Atlantic Canada in the growth of ICT goods exports. The province has underperformed in one sub-sector, telecommunications services, where it has lagged in both revenue and employment growth. Table 1 provides further details.

**Table 1**  
**ICT REGIONAL PERFORMANCE COMPARISON**  
(compound annual growth rates, 1997-2004)

	Manufacturing		Software & Computer Services		Telecoms Services		Goods Exports	R&D Spending†
	Revenue Growth (%)	Employment Growth (%)	Revenue Growth (%)	Employment Growth (%)	Revenue Growth (%)	Employment Growth (%)	Export Growth (%)	Spending Growth (%)
BC	3.5	4.5	14.4	9.5	2.4	0.5	3.8	15.5*
Alberta	-3.7	-4.5	11.0	5.9	6.4	4.7	2.8	
Prairies	-2.3	-0.5	10.1	4.6	5.2	1.5	-1.8	6.6**
Ontario	-2.6	-2.6	13.2	8.1	7.3	3.4	-0.2	5.1
Quebec	-1.2	2.8	12.9	8.4	4.6	-1.1	-3.7	9.5
Atlantic	6.2	1.8	12.1	9.4	5.7	1.3	11	1.8

† 1997-2003. \* Includes the Territories. \*\* Includes Alberta.  
Source: Information and Communications Technologies Branch, Industry Canada, *ICT Sector Regional Report – Overview* (August 2006).

<sup>3</sup> Canadian ICT Sector Profile, op. cit.

<sup>4</sup> Ibid.



British Columbia's ICT manufacturing sub-sector reported revenues of \$1.4 billion in 2004, equal to 6% of the national total. The software and computer services sub-sector posted revenues of \$3.4 billion, amounting to 11.5% of the Canadian total. As noted above, BC trailed other regions of the country in the growth of telecommunications services revenue from 1997 to 2004. In the latter year, BC accounted for 12% (\$4 billion) of Canadian telecommunications services revenue.<sup>5</sup> There was almost no net job growth in BC's telecommunication services industry from 1997 to 2004.

Turning to exports of ICT products, British Columbia recorded bigger gains than every region except Atlantic Canada (which supplies just 1% of national exports) over the 1997-2004 period. However, BC produced only 7% of Canadian ICT goods exports, compared to Quebec's 28% share and Ontario's 57%. Over 70% of all of the ICT goods produced in Canada are exported to foreign markets.

The ICT sector is characterized by rapid technological change, which puts a premium on research and new product development. R&D expenditures in the sector have increased significantly in British Columbia. In fact, BC led the country in the growth of R&D spending over 1997-2003. The ICT sector is a leading contributor to Canada's collective R&D effort, responsible for almost 40% of national R&D expenditures.<sup>6</sup> In BC, the sector provided 44% of overall R&D expenditures in 2003 - second only to Ontario (48%)

### **A Closer Look at British Columbia's ICT Sector**

BC's thriving ICT sector is centred in Greater Vancouver, which is home to roughly two-thirds of the 6,000 firms operating in the province. The "Silicon Vineyard" in the Okanagan, with 150-175 companies, is home to a substantial portion of the remaining one-third. Other regions hosting ICT firms include Greater Victoria and a few communities in the north.

The ICT sector is the largest of BC's several technology clusters, generating more revenue and employing more people than all of the other advanced technology sectors combined. Specific ICT industries with a substantial presence in BC include wireless and new media, software development (including gaming and animation) and electronics and advanced manufacturing.<sup>7</sup>

Employment in the province's ICT sector has increased sharply since the early 1990s (Figure 2), and is expected to continue growing at a solid pace going forward. Significant numbers of job openings are forecast for ICT sub-sectors like computer, electronic and electrical

---

<sup>5</sup> Ibid.

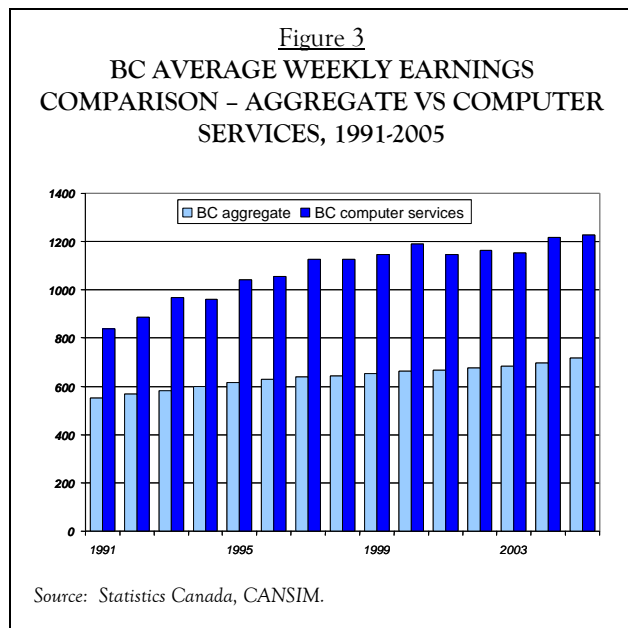
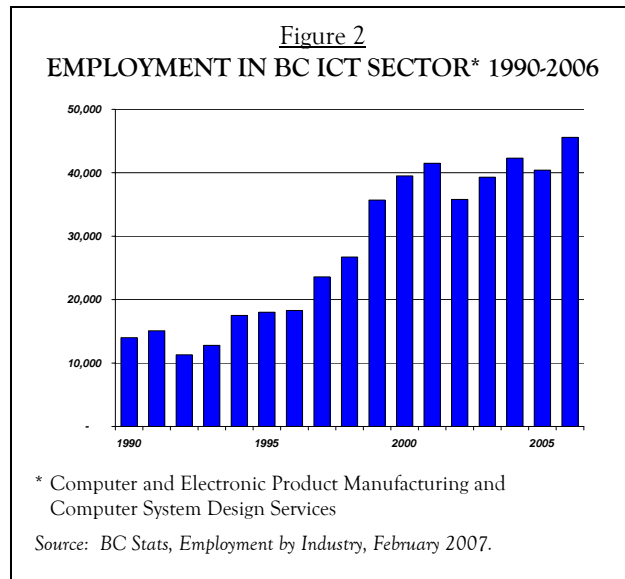
<sup>6</sup> Data for 2003. Ibid.

<sup>7</sup> Leading Edge British Columbia, The Information & Communications Technologies (ICT) Cluster in British Columbia: Open for Investment and Partnerships (2006). Leading Edge has been absorbed into Invest British Columbia.



products and computer systems design services, mainly due to net employment growth rather than to vacancies caused by attrition.<sup>8</sup> Of interest, average earnings in the computer systems design services industry are well above the BC aggregate (Figure 3). And at the national level, employees in the broader ICT sector enjoy annual earnings almost 50% higher than the economy-wide average.<sup>9</sup>

To compete and grow, ICT firms depend on ready access to a skilled and well-educated workforce. In BC, much of this workforce is drawn from local post-secondary education and training institutions, which also play significant research and commercialization roles for the industry. At the university level, UBC and the University of Victoria have strong computer science and computer engineering departments offering undergraduate and graduate-level degrees, as well as a number of unique programs, including UBC's Master's of Software Systems and UVic's specialized options in health informatics and geomatics, among others.



Simon Fraser University's highly regarded computer engineering faculty emphasizes programs in artificial intelligence, bioinformatics, and computer graphics and visualisation, among others. Each university also operates or participates in a range of multi-disciplinary research centres to advance knowledge in ICT-related fields. The British Columbia Institute of Technology (BCIT) offers Master's degree programs in technology, as well as professional programs for ICT workers already in the field to enhance knowledge in programming, networking, project management and business/systems analysis.

The universities are also responsible for numerous ICT start-up firms, via their University-Industry Liaison Offices and contracted applied research. Approximately half of all high

<sup>8</sup> Ministry of Advanced Education, COPS BC Unique Scenario 2003-2013 (September 2005).  
<sup>9</sup> Canadian ICT Sector Profile, op. cit.



technology companies spun-off by the University of Victoria and SFU have been in the ICT field. Many other ICT firms in the province were formed and have and grown over time thanks to support from angel investors and subsequent venture capital financing, assistance from federal and provincial R&D tax credit programs, public share offerings, and equity injections by other ICT firms.

In summary, the ICT landscape in BC is characterized primarily by small firms, a highly skilled workforce, a good track record of research and commercialization by the province's universities, and a range of public and private financing options. British Columbia has outperformed the national average on many measures of ICT activity. However, there are hurdles that must be overcome if the sector is to reach its potential.

### **Assessing BC's Potential**

ICT is a global industry, so BC's position is best analysed on a North American, if not a world-wide, comparative basis. A 2004 consulting exercise examined the ICT sector along four dimensions and compared the BC industry with similar clusters in competing states and provinces. Past research points to a handful of factors that have been critical in developing world-class ICT clusters in regions such as California's Silicon Valley and Austin, Texas:<sup>10</sup>

- Excellence in research and development, anchored by strong research universities
- A concerted focus on commercialization
- A highly entrepreneurial business culture
- Success in large company formation

The growth of British Columbia's ICT sector has been impressive, even when compared to regions like California and Washington. However, BC's R&D performance, while good relative to other Canadian regions, has been weak judged against leading American states on a per capita basis. The 2004 consulting study identified R&D investment as a particular challenge in BC in later phases of new product innovation.<sup>11</sup>

On commercialization, BC ranks highly on the number of inventions registered per million dollars of academic R&D investment. Indeed, on this indicator it leads all other Canadian provinces as well as Massachusetts, California, North Carolina, Texas and Washington. This points to good returns per dollar of academic research, albeit at the time of the 2004 report BC had proportionately lower levels of academic R&D investment than most competing jurisdictions. The province does less well when measured by total US patents per

---

<sup>10</sup> ICF Consulting, Growing British Columbia's Information Technology Cluster: Setting the Stage for Collaborative Strategy (October 2004).

<sup>11</sup> It should be noted that some data used for the ICF study date back to 2000/2001, with most other data from 2003, so BC's showing on certain performance indicators may have changed in recent years.



million residents and the number of licensed new inventions, ranking only ahead of Alberta in Canada and trailing all American states with substantial ICT clusters. British Columbia creates more ICT start-up firms relative to the extent of licensing activity than other states and provinces, but it has a weaker record than US jurisdictions, Ontario and Quebec in early stage venture capital investment. The aforementioned 2004 consulting study concluded that commercialization in the province's ICT sector would benefit from higher levels of R&D and increased early-stage venture capital investment.<sup>12</sup>

BC ranks highly on indicators of entrepreneurship. The province's ICT sector features a higher proportion of young companies (less than three years old) than Washington, Utah, Colorado or California. New company formation and financial support through to a stable operating position provide evidence of a region's entrepreneurial spirit and is a key stage in the development of successful industry clusters.

Where BC falls down noticeably is in large company formation – the process by which smaller companies grow to a point where they reach a globally competitive scale. At the time of the 2004 study, BC trailed all comparator regions in late-stage venture capital per capita. Measured by the number of publicly traded ICT companies listed on US exchanges per million residents, California had over five times as many companies, and Washington and Colorado each had more than twice as many, as British Columbia (which had less than one listed ICT firm per million residents in 2004). BC was home to only three ICT company head offices in the Financial Post's latest report on the 500 largest Canadian corporations: TELUS Corporation, MacDonald Dettwiler and Associates Ltd., and Creo Inc. (which became a subsidiary of Eastman Kodak Company in 2005). One additional BC firm was included in the FP's "next 300" group: PMC-Sierra Inc.<sup>13</sup>

British Columbia's disappointing record in large company formation has resulted in an ICT sector with very few "anchor" companies. What explains this picture? Among the reasons cited by analysts are weaknesses in venture capital investment and a pattern of takeovers/buyouts of successful local ICT firms by bigger, out-of-province companies. The tax system in Canada also plays a role. Certain features of business taxation in Canada actually encourage companies to remain small, while other tax rules make it difficult for non-Canadian investors to justify taking equity positions in Canadian technology firms.<sup>14</sup> In

---

<sup>12</sup> ICF Consulting recommended increasing academic R&D investment to accelerate commercialization. However the method by which innovations are licensed may influence the perceived role of academia in commercializing innovations: SFU President Michael Stevenson notes that Canadian universities are more likely than their US counterparts to license an innovation to the spin-off company, rather than the university department or research institute that generated it. (Dr. Michael Stevenson, "The Public University and the Private Sector: Creating a New Partnership," speech to the Vancouver Board of Trade (May 28, 2002.)

<sup>13</sup> National Post, FP500 (June 2006). The "next 300" group consists of the companies ranked 501<sup>st</sup> to 800<sup>th</sup> in annual revenues in 2005.

<sup>14</sup> In Canada, small businesses pay lower rates of federal and provincial corporate income tax than mid-sized and large companies. Canadian-controlled private corporations (CCPCs) have access to R&D tax credits that are more generous than those available to other types of business. Under the federal *Income Tax Act*, a cross-border merger between a Canadian company and a foreign company not doing business in Canada results in a



addition, large company formation is less likely in an environment where firms generating successful processes and products end up being purchased by outside industry “giants” – and where the end goal of many local entrepreneurs is not to build a major company, but to develop a product to the point where their company becomes an attractive takeover candidate.

All of this has implications for the size and prospects of the province’s ICT sector. The scope of any industry affects the availability of management talent and experience in any particular region. In BC, solid ICT expertise exists in programming, systems design and manufacturing at various technical levels, as the province’s education system supplies graduates with relevant knowledge in these areas.<sup>15</sup> But expertise is harder to find at more senior levels, including roles such as chief financial and chief technology officer, sales manager, and product manager. The lack of a critical mass of sizable local ICT firms makes it challenging to attract experienced senior management personnel from other jurisdictions. Despite the recognized appeal of living and working in BC, there are risks associated with taking a senior position in a company that is part of what by global standards is still a fairly small local industry cluster.

If it is difficult to recruit, retain, or grow experienced senior managers in an industry with few large companies, often it is also a challenge to secure later-stage capital for companies aspiring to grow in the absence of experienced management teams in which investors can place their confidence. This somewhat circular problem may best be approached by revisiting some of the early stage weaknesses in province’s ICT sector. Increased R&D and more collaboration, both within the sector and with universities and government agencies, could assist in building the critical mass needed to make BC more competitive with other North American regions and to create an environment more supportive of large company formation.

There are also a number of modifications to federal and provincial tax policies that would improve the prospects for building global-scale ICT companies from a British Columbia base. Examples include reducing the gaps between small and large enterprise corporate tax rates, enhancing venture capital tax incentives, expanding access to the Scientific Research and Experimental Development tax credit program, and adopting measures to make it more attractive for non-Canadian venture capital funds and other foreign investors to invest in growing Canadian technology firms. Here in BC, the Premier’s Technology Council recently made a number of recommendations that are consistent with these policy directions: 1) make refundable tax credits under the SR&ED program available to all companies in BC, not just Canadian-controlled private corporations; 2) lift the individual annual limit in the provincial *Income Tax Act* for angel investors in eligible small businesses under the *Small*

---

deemed share disposition, with consequential adverse tax consequences. Finally, the lack of recognition of Limited Liability Corporations (LLCs) under the Canada/US Income Tax Convention is a deterrent for US capital investment in Canadian technology companies.

<sup>15</sup> Of interest, some of the province’s ICT firms, particularly in the gaming sub-sector, are engaging in overseas recruitment to meet their skilled labour needs.



*Business Venture Capital Act*; and 3) lobby the federal government to remove administrative and fiscal constraints that deter foreign capital investment in Canadian companies and venture capital pools.<sup>16</sup> Implementing these recommendations would help to develop a larger and more sustainable risk capital market in BC and be of considerable benefit to all of the province's advanced technology sectors, including the ICT industry.

### **Conclusion**

The information and communications technologies sector is a dynamic and growing part of the Canadian and BC economies. Looking ahead, the ICT sector's increasing contributions to the province's GDP and exports, together with the growing number of skilled and well-paid jobs it supports, provide an important foundation for developing a more diversified, innovative and knowledge-based provincial economy. As the sector continues to recover from the 2000/01 downturn, the challenge is to leverage BC's advantages to build an industry cluster with more anchor companies that is able to compete with the leading American ICT producing regions.

\* \* \* \* \*

Jock Finlayson  
Executive Vice President - Policy  
[jockf@bcbc.com](mailto:jockf@bcbc.com)

Karen Graham  
Senior Policy Analyst  
[kgraham@bcbc.com](mailto:kgraham@bcbc.com)

---

<sup>16</sup> Premier's Technology Council, 8<sup>th</sup> Report (March 17, 2006).