

# **British Columbia's Industrial Landscape: Technology & Innovation Outside the Metropolitan Areas**

***CPROST Report # 95-03***

***Prepared for  
Science Council of British Columbia***

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## ***Summary and highlights***

This report presents new findings about the population, innovativeness and geographic distribution of science and technology- based businesses in British Columbia. Although the work is still preliminary in nature and continues to build on a long-term research program at Simon Fraser University, the findings contain some surprises. Clear evidence is accumulating which shows that technological innovation and its attendant research and development (R&D) are much more widespread than previous figures and public perceptions would indicate.

## Highlights

- Regions discussed in this report are as follows: Peace River, East and West Kootenay, North Island, Mid Island, Central Interior, Northern Interior, and Okanagan.
- These regions contain 22.8% of BC's known S6CT- based companies.
- 48.8% perform or invest in product, process or service development or improvements.
- This figure compares with 54.7% for the province as a whole.
- A large fraction of such companies typically qualify for financial benefits earned under the SR&ED tax incentive program. However, on average only 30.8% of candidate companies in BC make use of the SR&ED program, and only 15.3% of innovative companies in the above mentioned regions.
- There appears to be a strong case for a provincial S&T awareness program to capitalize on the SR&ED and other existing programs to foster job creation and industrial growth through technological innovation.

## 1. Introduction and background to the study

This report presents new findings from an extensive survey of Industry, Technology and Innovation in British Columbia. The results focus on regions of the province outside of major metropolitan areas and reflect a sub-sample of data gathered from 819 completed interviews with business enterprises operating throughout British Columbia. The interviews drew from a sample of 1,017 firms, selected as representative from the more than 13,000 records contained in the industrial demographics database described by Lipsett and Lipsey (1994).

The interviews were conducted between July 6 and November 30, 1994, the status of which are listed in the following table.

**Table 1: Status of firms in survey**

<b>Firm category</b>	<b>Number</b>
Innovative	448
Non-Innovative	371
<b>total S&amp;T based firms in sample</b>	<b>819</b>
Inapplicable or out of business	116
Refused to participate	17
Location of firm unknown	55
Contact not made	10
<b>Total</b>	<b>1017</b>

Of the 819 firms interviewed, 200 were located in specific regions as shown below:

**Table 2: Distribution of firms by region**

Region	Postal Code	# of Firms
Peace River	V1J, V1G, V0C	6
East Kootenay	V0B, V1C	9
West Kootenay	V0G, V1N, V1L, V1R	13
North Island	V0P, V9G, V9H, V9J, V9W, V9M, V9N	11
Mid Island	V0R, V9R, V9T, V9L, V9P, V9V, V9K, V9S	24
Central Interior	V2C, V2H, V2B, V1S, V0K, V2G, V0L, V1P, V2E	42
Northern Interior	V2L, V2M, V0J, V2N, V2K, V2J, V0E, V1H	32
Okanagan	V2A, V1Z, V1T, V1W, V1E, V1V, V1Y, V1X, V1K, V1B, V0H	63
	<b>Total</b>	<b>200</b>

The survey sought three types of information

- core information about the demography of BC firms
- knowledge about the National Research Council's IRAP program, and
- awareness use and impact of Revenue Canada's SR&ED program.

Section 2 of this report explains the methodology involved in selecting the firms used in the current survey. Details of the methodology are set out in a related report (de Wit, Lipsett and Darby, 1995). Section 3 discusses the participation rate of non-metropolitan firms in Revenue Canada's SR&ED investment tax credit program, as well as some discussion of the innovative activities of firms in these regions. Section 4 offers some summary comments and discussion of the significance of reported results with regard to the overall community of innovative firms in the highlighted regions.

## 2. Methodology

The work we describe was conceived of as the first stage of verifying and updating a new and comprehensive BC industrial demographics database

Carried out in the summer and fall of 1994, this stage was designed to:

- serve as a pilot evaluation of the quality of the larger database
- evaluate the questionnaire and test the interview methodology
- assess awareness of NRC's IRAP program
- evaluate use, awareness and impact of the SR8cED program
- explore patterns of employment and economic importance
- classify industrial activities by fields of science and technology

We chose a large, but manageable representative sample as our starting point. One thousand and seventeen firms were selected using a representative sampling technique from a larger database containing 13,705 firms.

### **Sampling technique**

Records (firms) in the database were obtained from three types of sources: eight government groups, both provincial and federal; two industry associations, both based in BC; and four public directories. In total, more than 22,000 records were received. Duplicate records were removed using a variety of techniques leaving 13,705 unique entries. Within this larger database, records reside in the order in which they were received (i.e. the first 5,000 originated From one agency, the next 700 from the next agency, and so on), and each subset of records was in alphabetical order.

This organization of the larger database allowed for a simple, efficient method of drawing a suitably representative sample. Since we wanted a sample of close to 1,000 firms, we simply chose every 14th record in the larger database, resulting in the sample of 1,017 firms<sup>1</sup>. This method ensured that the sample was representative within and across the constituent databases.

Once the sample was generated, a single interviewer (John Darby) commenced the task of contacting each company included in the sample. Interviews were completed on November 30, 1994, the results of which are listed in Table 1.

### **Validity of results**

The database was constructed with the intention of including as many science and technology-based, innovative firms resident in BC as possible. Given the origin of the records, there is a heavy emphasis on manufacturing firms. While some service firms (mostly From the information science and technology sector) are included, the overall sample is not perfectly representative of all firms in BC<sup>2</sup>. As a result, the

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<sup>1</sup> Note that  $13,705/14 = 978$ . The additional 39 companies were discovered during our survey. For example, several companies in the database were found to have been split into two separate and distinct entities. As a result, the newly discovered companies were added to the original sample.

<sup>2</sup> University research units, crown corporations, government departments, charitable organizations and firms deemed unlikely to be involved in technological innovation were excluded in order to focus on science and technology -based firms in the private sector.

following results are suggestive of the regional patterns of industrial demographics, but further work remains to obtain a truly comprehensive picture.

### 3. Regional experience with the SR&ED program

In recent years, Revenue Canada's Scientific Research and Experimental Development (SR&ED) Investment Tax Credit (ITC) program has taken on increased importance in fostering innovative activity in Canada. However, it has been pointed out by some observers (Goodchild and Lipsett, 1994) that the beneficiaries of this program are not necessarily equitably distributed geographically across Canada. Indeed, as shown below, there is uneven awareness and utilization of the program among potentially eligible firms within a single province, namely BC. In a later section we discuss how our findings demonstrate that many earned benefits have gone unclaimed and unused in BC, particularly in the regions remote from major metropolitan centres.

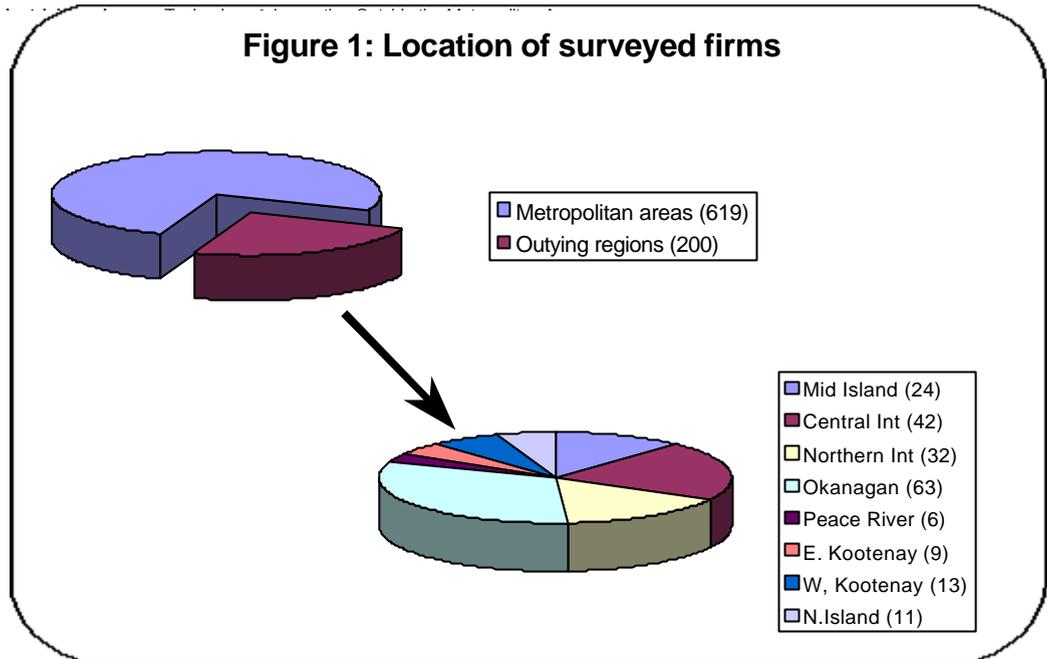
The following table shows the utilization of the SR&ED program by firms in various non-metropolitan areas in BC. Column 1 lists the region of interest, column 2 the number of firms contacted out of the 819 firms contacted in the larger survey, column 3 the number of "innovative firms" (how a firm is deemed innovative will be explained later in this section), column 4 the number of applicants to the SR&ED program in that region, column 5 the percentage of innovative firms surveyed in the region who have applied for ITCs (column 4 divided by column 3), and column 6 the percentage of all BC firms located in the respective region.

Notice that out of 819 respondents 200 were from the non-metropolitan areas. The distribution is illustrated graphically in Figure 1 as Follows:

**Table 3: Regional utilization of SR&ED program**

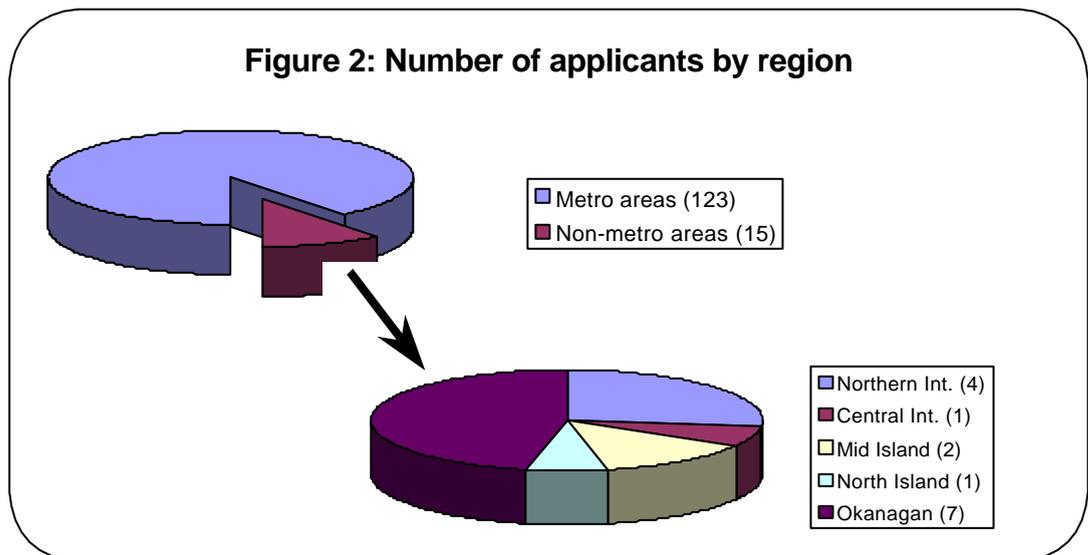
(1)	(2)	(3)	(4)	(5)	(6)
Region	# of firms (in sample) by region	# of innovative firms	# using SR&ED program	%using SR&ED program	% of BC firms in region
Peace River	6	2	0	0.0%	0.8%
East Kootenay	9	3	0	0.0%	1.0%
West Kootenay	13	3	0	0.0%	1.3%
North Island	11	8	1	12.5%	1.1%
Mid Island	24	13	2	15.4%	3.6%
Central Interior	42	19	1	5.3%	4.4%
Northern Int.	32	17	4	23.5%	3.8%
Okanagan	63	33	7	21.2%	6.8%
<b>Regional Total</b>	<b>200</b>	<b>98</b>	<b>15</b>	<b>15.3%</b>	<b>22.8%</b>
<b>Provincial Total</b>	<b>819</b>	<b>448</b>	<b>138</b>	<b>30.8%</b>	<b>100.0%</b>

**Figure 1: Location of surveyed firms**



Given that only 22.8% of all firms are located in these areas, the regions were slightly over-represented in the larger survey. In spite of this, only 15 firms (7.5%) out of the 200 were found to have had experience with the SR&ED program. This was less than half the 16.8% observed for the province as a whole. If we look at the regions of Peace River, East and West Kootenay, not a single applicant to the SR&ED program was found in the sample (see Figure 2 below). However, caution should be exercised in drawing firm conclusions for these regions since the sample size was so limited at this level of detail.

**Figure 2: Number of applicants by region**

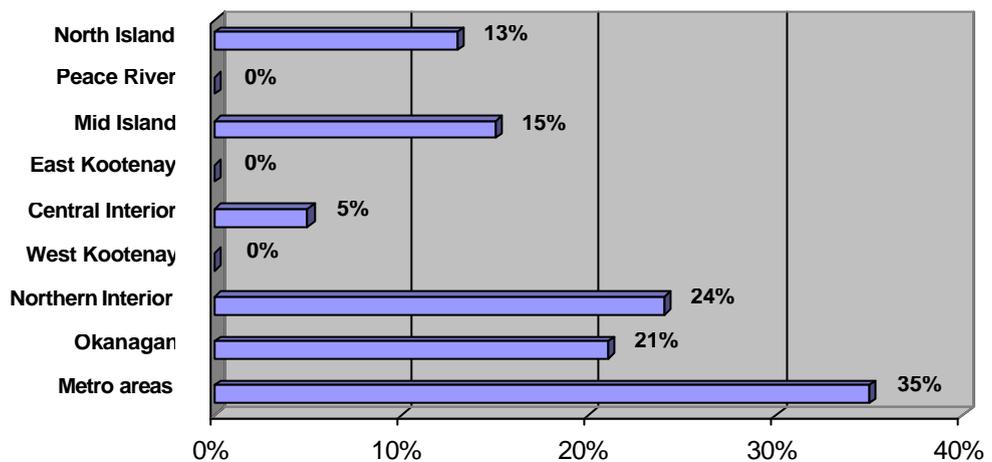


**Are regional firms missing out on SR&ED benefits?**

Figure 3 shows the percentage of innovative regional companies applying

for SR&ED benefits. Clearly there are major regional imbalances, and although many firms throughout BC are apt to be missing out on SR&ED benefits, the gap is greatest in the regions. Every region is well below the provincial average of 30.9%, which itself is a surprising figure since it implies that almost 69% of BC companies are missing out on the SR&ED program. But the use of the program in the regions is far below that in the population centres. Only 15.3% of innovative firms in the regions use the SR&ED program compared with 35% in the metropolitan areas.

**Figure 3: Percentage of innovative companies claiming SR&ED benefits**



Total = 138 out of 819 firms surveyed

The reasons for this are not immediately clear. It could be that firms in these regions are geographically remote from federal and provincial government information, programs and services, and have been correspondingly overlooked or neglected. It should be pointed out, however, that if there has been federal and provincial neglect of these firms, the existence and importance of these firms has, until recently, been unsuspected or difficult to prove.

**Are regional firms less innovative than those in large population centres?**

Regional firms turn out to be equally innovative to those in the large population centres! This is demonstrated by the Industrial Demographics database and the 1994 survey as follows:

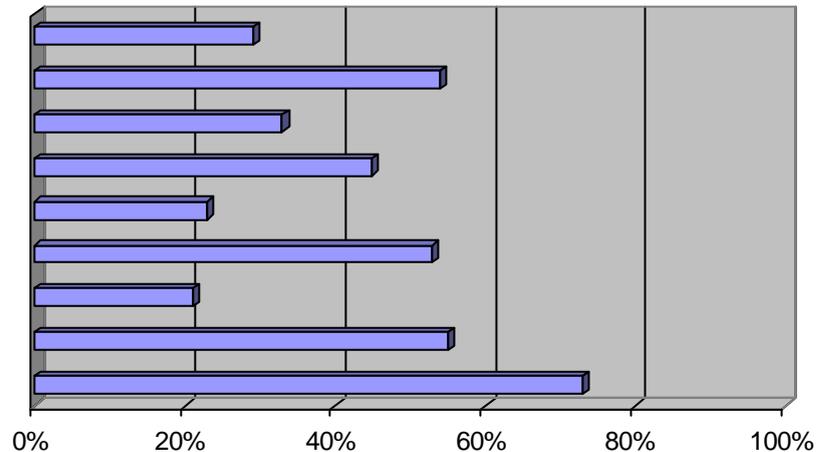
In the survey the following question was asked:

*Which of the following kinds of work are carried out and/or funded by your company?*

- supply or deliver products or services that are routine in nature
- develop or improve products or services
- develop or improve manufacturing or production processes
- use or combine technologies in new ways
- early stage research and development R&D

Any of the activities described in the 2nd through 5th questions are embraced by the SR&ED program and are indicators of R&D. Of the 819 respondents in the larger survey, 790 placed their firms in the first category, 301 in the second, 258 in the third, 202 in the fourth, and 269 in the fifth respectively. More to the point, 371 were in the first category and not in the other four. Accordingly, we designate these 371 (45.3%) firms as "non-innovators," and the other 448 (54.7%) firms as "innovators."

Figure 4 illustrates how the regions compare with the provincial average. Four of the eight regions are close to the provincial average. The exceptions are Peace River, East and West Kootenay, and North Island, the figures for which are based on small sample sizes. It may



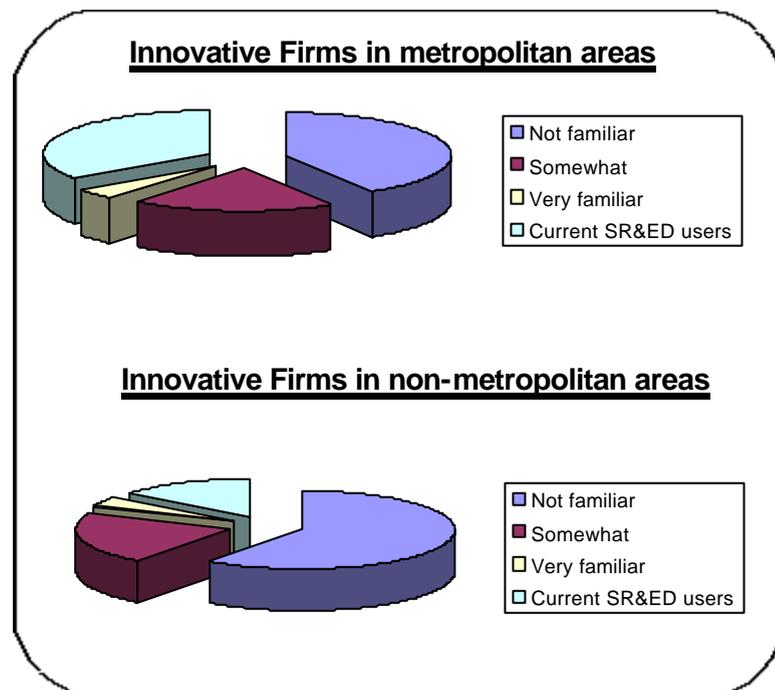
prove to be the case that these regions are also close to the provincial average. In any event, although the sampled firms are seldom SR&ED applicants, there is no reason to believe that regional firms are less innovative than firms in metropolitan areas.

This finding raises the question, "Are firms in these regions less informed of the money potentially available to them through the SR&ED program?"

Figure 5, below, suggests that the answer is an overwhelming "yes!" Provincially, 45.4% of all innovative firms had not heard of the SR&ED program. In the regions of interest, however, we see that over 62% of firms had not heard of the SR&ED program.

It has been pointed out elsewhere (de Wit, Lipsett and Darby, 1994) that as much as \$50 million annually goes unclaimed by BC companies. Given the low level of awareness amongst innovative firms located in non-metropolitan areas, one can only speculate about how much of this could be funneled into the economies of these regional interests. Other provinces are less reticent in attracting attention to and building on the SR&ED program, and this may account for net outflow of tax benefits From BC to Quebec and Ontario (see Warda, 1994, and Goodchild and Lipsett, 1994).

**Figure 5: Familiarity with SR&ED Program**



#### 4. Summary conclusions and comments

The regions discussed in this study are home to approximately 23% of BC's science and technology (S&T) based firms and a similar percent of BC's innovative firms.

The delivery – or at least the use – of Revenue Canada's SR&ED program appears to be significantly uneven across BC. Many firms in the regions discussed in this report are missing out on significant financial benefits that they have earned but are not claiming. While this is the case

for all of BC, it is particularly so outside of the metropolitan areas which appear to be favoured over the non-metropolitan regions.

The caveats are as follows. First, due to the small size of the sub-sample analyzed the results for four of the regions (Peace River, East and West Kootenay, and North Island), point to the need for a more in-depth study.

Second, and more importantly, the reader should consider that observing any community of innovative firms is difficult due to its inherently dynamic nature. For example, in our survey, firms were contacted from July through to November, 1994. They were not contacted *simultaneously*, so that any observation we make is not a snapshot in time. It may be the case that firms who reported non-use of the SR&ED program at the time of contact, later made use of the program. This may have occurred because of our phone call, or through contact with other users.

The information in this study is preliminary in nature. A larger sampling of firms from peripheral regions is required for more conclusive results. Such work is part of the ongoing Industrial Demographics program at CPROST, and contact with an additional 1,500 firms is under way at this time.

It should also be pointed out that we are only presenting a one period observation of the industrial demographics in the regions at this stage of the program. In the future, we plan to report on how industrial demographics change over time in response to market pressures and government measures which operate on technological innovation and industrial growth and employment.

Nevertheless, in the view of the authors, there is a clear and present need among firms in the regions analyzed for informational assistance in order to better exploit the SR&ED program. As mentioned earlier, there could be substantial uptake of ITCs, which would have significant positive effect on the economies of these regions since much of the financial benefits would likely take the form of cash refunds. We recommend that Science Council take steps to capitalize on this opportunity.

While not specifically discussed in this report, employment figures are available for the surveyed firms in the Industrial Demographics Database. Analyses will be presented in future CPROST reports.

## 5. Acknowledgments

Many people are contributing to this work. We list them by organization to indicate the extent and importance of collaboration in the community, but not to share responsibility for mistakes or opinions in the paper. The team of contributors consists of BC Tel, Dynapro Systems, Science Council of BC, Ministry of Employment and Investment, National Research Council/IRAP Program, BC Advanced Systems Institute, Revenue Canada, Industry Canada, Western Economic Diversification, BC Trade, BC Biotechnology Alliance, Vancouver Island Advanced Technology Centre, and the Social Sciences and Humanities Research Council of

Canada. The encouragement, support and goodwill from everyone involved is gratefully acknowledged.

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