

ATTRACTION AND RETENTION OF BRITISH COLUMBIA TECHNOLOGY TALENT

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ABSTRACT

This paper investigates issues related to attraction and retention of British Columbia (BC) technology workers. Academic research, interviews, and popular literature provide the basis for analysis. Motivational issues for workers and analysis of technology clusters are key research elements. The purpose of the report is to provide recommendations that address the identified recruiting and retention issues.

This paper consists of eleven chapters. The first chapter identifies the key research questions. Chapter two summarizes the BC technology clusters. Chapter three describes technology worker motivational factors for geographic relocation. Chapters four, five, and six provide an analysis of BC against the motivational factors. Chapter seven describes recruiting strategies of other geographic areas. Chapter eight compares BC to general characteristics of technology clusters. Chapter nine discusses strategic alternatives. Chapter ten provides recommendations for improving BC's recruiting and retention. Chapter eleven summarizes the key findings.

To my dear wife Dianne, who motivates and inspires me every day.

Thank you for your love and support.

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TABLE OF CONTENTS

Approval	ii
Abstract	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vi
List of Figures	viii
List of Tables	ix
1. Introduction	1
2. Description of the British Columbia Technology Clusters	4
3. Considerations for Relocating to a New Geographic Region	8
4. Job Offers by BC Companies	11
4.1 Employee Net Disposable Income	11
4.2 Employee Benefits.....	17
4.3 Ability to Offer Exciting Work	20
4.4 Management Effectiveness of BC Companies	22
4.5 Summary – BC has Low Net Income, Exciting Work, and Well Managed Companies.....	24
5. Future Career Opportunities in BC	25
5.1 Employment Size of the BC Technology Cluster.....	26
5.2 R&D Spending in BC	29
5.3 Entrepreneurship in BC.....	32
5.4 Industry Support to BC’s Technology Clusters.....	35
5.5 Government Plan For Cluster Growth.....	40
5.6 Post-Secondary Education in BC for Technology Workers	43
5.7 Summary – Future Career Opportunities in BC Are a Serious Concern For Recruits.....	45
6. Lifestyle in BC	46
6.1 Living Conditions Reflect Environmental Quality, Amenities, and Life Expectancy	46
6.2 Schools Are Important to Recruits With Children	47
6.3 Public Safety Includes Violent Crime and Property Crime.....	48
6.4 Tolerance Reflects Regional Diversity	49
6.5 Summary – BC Lifestyle Has Strong Appeal To Recruits.....	49
7. Regional Recruiting Strategies	50
7.1 Better Incentives and Salaries	50
7.2 Technology Circles Emphasize Geographical Networking	51

7.3	Brand the Geographic Location	51
7.4	Increase Academic Attraction	53
7.5	Design Custom Recruiting Programs for Expatriates	54
7.6	Summary – Geographic Regions Are Using Diverse Strategies To Attract Recruits	54
8.	General Characteristics of Technology Clusters	55
8.1	Regional Technology Clusters Specialize By Product.....	55
8.2	Crucial Factors for Development of a Research-Dependent Cluster	57
8.3	Role of Government in Technology Cluster Development.....	58
8.4	Summary - Academic Research Reinforces Relocation Perceptions of Recruits	59
9.	Alternatives for BC Recruiting Strategies	60
9.1	Strategic Recruiting Issues	62
9.2	Strategic Alternatives	62
9.2.1	Develop new clusters versus building on existing clusters	62
9.2.2	Replicate specific strategies used by other regions	63
9.2.3	Continue using only current strategies	63
9.2.4	Focus exclusively on a single motivational factor	64
9.2.5	Develop and implement plans that address each motivational factor.....	64
10.	Recommendations to Improve BC Recruiting and Retention	65
10.1	Improve Job Offers	65
10.2	Enhance Future Career Opportunities	67
10.2.1	Define BC's long term technology cluster goals	67
10.2.2	Brand BC for the technology industry	69
10.2.3	Aggressively pursue the “right” kind of companies for BC	70
10.2.4	Increase R&D funding for colleges and universities	71
10.3	Support “Quality of Life” Programs.....	72
10.4	Support to Company Recruiting Efforts.....	72
10.4.1	Provide a recruiting information web site.....	72
10.4.2	Program for recruiting expats is not recommended	75
11.	Conclusion.....	77
	Appendix: Interview List	78
	References.....	79

LIST OF FIGURES

Figure 1:	The job offer, future career opportunities, and lifestyle are the key considerations for geographic relocation	8
Figure 2:	Personal disposable income is lower in BC than many other geographic regions	12
Figure 3:	Vancouver has similar salaries to other Canadian cities, but significantly lower salaries than several U.S. cities	14
Figure 4:	BC has the highest cost of housing among Canadian provinces, but compares favourably to some regions in the United States	15
Figure 5:	The cost of living in Vancouver is similar to other North American cities.....	16
Figure 6:	The European Union has substantially higher mandated leave days than North America and Japan.....	19
Figure 7:	BC companies provide strong returns to investors.....	23
Figure 8:	The BC Biotech cluster is one of the smallest in North America	27
Figure 9:	The percentage of technology workers in BC is lower than many U.S. technology centres	28
Figure 10:	BC spends proportionately less on R&D than many other geographic regions in North America.....	30
Figure 11:	BC has smaller venture capital investment than many high technology regions.....	33
Figure 12:	The Integrated Technology Initiative demonstrates cooperation between the BC industry associations to support technology cluster growth.....	39
Figure 13:	Vancouver has similar university enrollment to several other North American cities.....	44
Figure 14:	BC is asking technology workers to trade off a positive lifestyle, for lower net disposable income within a small technology cluster without a regional plan.	61
Figure 15:	The proposed BC technology cluster goal emphasizes growth, technology leadership, attractiveness to employees, and quality of life	67

LIST OF TABLES

Table 1: BC has six diverse technology clusters, mostly consisting of small companies5

Table 2: BC competes for talent primarily from the United States, other Canadian provinces, and Europe6

Table 3: There are many examples of exciting work within BC technology companies21

Table 4: BC has many different mechanisms for funding high technology.....31

Table 5: The BC technology clusters have strong representation by local industry associations37

Table 6: Geographic regions specialize by product offerings.....56

Table 7: www.techtalentbc.ca provides recruiting information in one convenient portal.....74

1. INTRODUCTION

The British Columbia Technology Industries Association (BC TIA) has a goal of doubling revenue and employment of BC technology companies by the year 2010. In response to this growth expectation, BC TIA has sponsored a recommendations paper (Griffiths & Crucil, 2003). The BCTIA paper describes a number of actions needed for BC's technology clusters to successfully compete both domestically and abroad for capital, employees, and customers.

The Integrated Technology Initiative (ITI) integrates the strategies for the proposed actions. These actions cover the areas of finance, human resources (HR), marketing, innovation, governance, and infrastructure (BC TIA, 2004). A management board that consists of executive members drawn from key BC technology industry associations directs the ITI.

HR is one of the highest priority areas within the ITI. Recruiting and retention issues have drawn specific attention due to the expected growth of BC labour. Recent surveys indicate that recruiting is a top concern of BC Chief Executive Officers. For the first time in many years, concerns regarding recruiting exceed concerns for obtaining financing (Drexhage, 2004). HR professionals have similarly expressed concern over BC's ability to attract needed talent over the next ten years (Humber, 2005).

Statistical data verify these concerns. BC will not be able to meet the expected employment needs without attracting external¹ talent. Canada will have zero population growth over the next few years (Beaman, 2005, p. 11). Furthermore, the number of available younger workers is insufficient to replace those workers that are leaving

¹ "External" means from other Canadian provinces, or from abroad.

(Beaman, 2005, p.12). Thus, the ability to recruit and retain BC technology talent is critical for meeting established growth goals. “Today, it is the ability to attract human capital or talent that creates regional advantage. Those that have the talent win, those that do not lose” (Florida, 2005, p. 50).

The objective of this report is to provide recommendations to the ITI management board on how to improve BC's recruiting and retention. The following questions are addressed:

- What factors motivate technology workers to relocate?
- How might potential employees evaluate BC against the relocation factors?
- What are the recruiting strategies of other regions?
- How can BC recruiting and retention be improved?

Studies have indicated that the above issues are also applicable to retention. A consultant for McKinsey (personal communication, 2002) argues that there is a blurring between recruiting and retention issues in respect to technology workers. Companies are being encouraged to consider themselves “continually” making job offers to employees. This is due to the high mobility of technology workers (Florida, 2005, p. 7). BC employees are assessing the same issues as are new recruits. Thus, addressing recruiting issues also addresses BC retention. This paper will primarily deal with recruiting issues, with the expectation that proposed solutions will also address retention issues. If we are able to make BC more attractive as a destination for workers, it follows that there will be a corresponding increase in retention.

This report uses a combination of academic research, popular literature/internet searches, and interviews. Academic research provides a quantitative basis for analysis.

Popular literature/internet searches provide insight into the types of information readily available to recruits². Interviews³ provide “real-life” experience in recruiting and retaining BC talent.

Several recruiting and retention issues are not part of this study. These issues, while important, are part of other ITI efforts or have separate government studies underway. These issues are:

- Identification of current and future technology skills
- Skills pipelines by BC colleges/universities
- Immigration issues
- Meeting long-term recruitment needs via existing immigrants, where English as a second language is a major barrier
- Tax policies to attract senior management talent

In summary, BC’s technology clusters are expecting substantial growth by the year 2010. This report evaluates BC against key criteria used by recruits in considering relocation. The report also examines strategies used by other geographic regions. The resulting recommendations will improve BC’s ability to attract and retain the talent needed to meet the growth goal.

The growth goal assumes increasing employment within BC’s current technology clusters. The clusters provide a context for the types of companies that are recruiting technology workers. Chapter 2 describes these clusters.

² The term “recruit” describes technology workers who might relocate to BC from other locales.

³ A list of interviewees is provided in the Appendix.

2. DESCRIPTION OF THE BRITISH COLUMBIA TECHNOLOGY CLUSTERS

British Columbia has six technology clusters: biotech/life sciences, energy technologies, information & communications technologies (ICT), new media, sustainability technologies, and wireless. Each of these clusters has “excellent potential for growth and international leadership” (Griffiths & Crucil, 2003, p. 4).

Table 1 provides a summary description of each of these clusters. BC has diverse clusters that cover a broad range of technology. Synergy also exists between clusters. Technologies such as fuel cells, telecommunications, and software appear in multiple clusters. This also implies some companies operate in multiple clusters, emphasizing synergy between the clusters.

Table 1 demonstrates that BC companies are relatively small. The average BC company has eleven (11) employees and an annual revenue of \$1.7M. The median number of employees per company is lower, due to the presence of large companies in each sector. For example, 20% of ICT and biotech companies represent almost 50% of the employees in each cluster (Griffiths & Crucil, 2003, p. 25; Leading Edge BC, 2005b). Interviewees also suggested that many BC technology companies consist of sole proprietorships. This further emphasizes the small average size of BC technology companies.

Table 1: BC has six diverse technology clusters, mostly consisting of small companies

Cluster	Sub-clusters	Companies (#)	Employees (#)	Annual Revenue (\$M)
Biotech/life sciences	<ul style="list-style-type: none"> • Therapeutics and diagnostics • Pharmaceuticals • Medical devices • Agriculture, marine, forestry • Environmental 	91	2,173	779
Energy technologies	<ul style="list-style-type: none"> • Alternative Engine Fuels • Biofuels, Biomass & Waste-to-Energy • Earth & Geothermal Energy • Fuel Cell Producers/others • Hydroelectric Energy • Power Electronics & Smart Energy • Solar, Wind, Ocean Energy 	60	3,000	600
Information & Communications Technology (ICT)	<ul style="list-style-type: none"> • ICT services • ICT manufacturing • Telecommunication services 	6,000	46,000	9,000
New Media	<ul style="list-style-type: none"> • Games • Animation • E-learning • Web Services 	700	14,000	1,000
Sustainability technologies	<ul style="list-style-type: none"> • Wastewater treatment • Power technologies • Geographic information systems (forestry, mining) • Site remediation • Environmental instrumentation • Waste to energy 	1,300	18,000	1,900
Wireless	<ul style="list-style-type: none"> • Components, Infrastructure & Devices • Data Carriers & Operators • Enabling Software & Services • Carrier Class Solutions • Enterprise Class Solutions • Content & WAP Portals • M-Commerce 	220	5,153	>1,000

Data compiled from: Leading Edge BC (2005c), Griffiths & Crucil (2003), Industry Canada (2004), Wireless in BC (2005), HighTech (2005)

Table 2 shows some of the geographic locations that the BC tech clusters typically recruit from, or compete against, for talent. Interviewees indicated that the identified geographic regions are not a complete list. These regions are merely representative of some major hubs of talent. It is clear that BC competes for talent against locations that are situated all over the world. However, most of the competition for talent is from other Canadian provinces and from the United States (U.S.). Additionally, several geographic regions compete against BC in more than one cluster.

Table 2: BC competes for talent primarily from the United States, other Canadian provinces, and Europe

BC Technology Cluster	Geographic Area Competition
Biotech/life sciences	San Diego, Boston, Raleigh-Durham, Silicon Valley, Seattle, Washington DC, Philadelphia, Los Angeles, Toronto, Montreal, various European locations
Energy technologies	Connecticut, Ontario, Los Angeles, Calgary, New York, Detroit, Japan, Germany, Montreal
Information & Communications Technology (ICT)	Ontario, Quebec, Alberta, Atlanta, Austin, Boston, Denver, Minneapolis, Phoenix, Portland, Raleigh-Durham, Sacramento, Salt Lake City, San Diego, San Jose, Seattle, Washington DC
New Media	Los Angeles, Austin, Montreal, Seattle, San Diego, Toronto
Sustainability technologies	Connecticut, Ontario, Los Angeles, Calgary, New York, Detroit, Japan, Germany, Montreal
Wireless	Washington D.C., Denver, Toronto, Atlanta, Seattle, New York City, Montreal, San Diego

Data compiled from: Dolan (2004), PriceWaterhouseCoopers (2004), Cortright and Mayer (2000, p. 3), personal communications.

Interviewees identified several key geographic regions for recruiting. The U.S. regions are Seattle, Silicon Valley, San Diego, Austin, and Boston. The Canadian regions are Alberta, Toronto, and Montreal. These are representative of the regions listed in Table 2.

Interviewees also identified Portland as an area for recruiting. Although Portland does not have clusters that compete directly with BC, a number of BC natives moved to Portland during the dotcom era. Portland developed a strong technology employee base from an economy originally based primarily on natural resources. This economy has some similarities to the Lower Mainland of British Columbia. Lessons learned from Portland provide useful insights into recruiting technology talent from outside a region.

In summary, BC has six diverse technology clusters. These clusters have some overlap in technology and companies. The BC companies are very small, averaging eleven (11) employees per company.

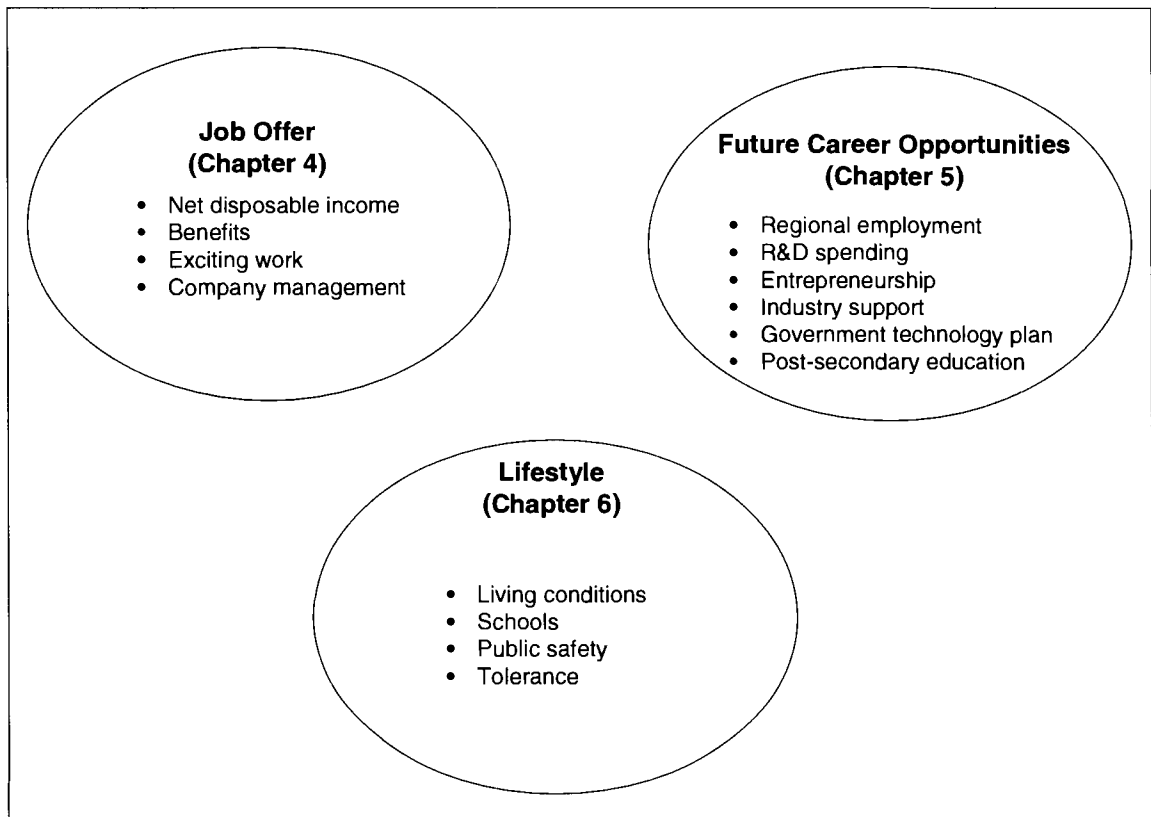
The clusters also compete for talent from all over the world. The competition is primarily from other Canadian provinces, the United States, and Europe. Competition also exists with regions such as Portland that share a common economic history with BC.

The next chapter discusses the factors that technology workers consider in relocating to BC from these other geographic regions.

3. CONSIDERATIONS FOR RELOCATING TO A NEW GEOGRAPHIC REGION

Kirkwood (1987) suggests a framework that he believes is used by technology workers when evaluating decisions to relocate: “a good job offer, future career opportunities, and a better lifestyle”. Figure 1 depicts this framework, augmented with research conducted by McKinsey & Company and Richard Florida.

Figure 1: The job offer, future career opportunities, and lifestyle are the key considerations for geographic relocation



McKinsey conducted over 13,000 surveys of personnel from various companies, including DoubleClick, Hewlett-Packard, Intel, Merck & Co., and Symantec (Michaels, Handfield-Jones, & Axelrod, 2001, p. xx). Top responses in the McKinsey survey included wealth creation, ability to meet personal/family commitments, exciting work, company management, career advancement, wealth creation, and lifestyle (Michaels et al., 2001, p. 45). These responses are a good fit with the framework suggested by Kirkwood.

Richard Florida carried out research that examines the relationships between the “creative class” and high technology cluster development. He describes key desires of technology workers. These desires include salary and benefits, established companies, and quality of life (Florida, 2005, p. 82). This is also an excellent fit with the Kirkwood framework.

The framework addresses questions technology workers consider about a geographic relocation. The job offer reflects the tangible benefits of the specific company to the employee. Future career opportunities reflect the ability to develop and grow a career in the geographic region. Lifestyle reflects the enjoyment and need fulfilment of the employee and family. Typical questions are:

- Job Offer. What is my compensation? Will the work be exciting? Is the company well run?
- Future Career Opportunities: Is the technology cluster large enough to find a new job if the current job does not work out? Are there good opportunities for advancement? Can I get additional training needed to grow my career?
- Lifestyle. Will my family and I enjoy living in the region? Will we be safe? Will my children get a good education?

The McKinsey survey and Richard Florida's work suggest that none of the framework elements has a higher priority over any other element. Both studies indicate that the weighting of the elements is highly dependent on the specific needs and wants of the individual recruit. This reflects the huge variance of individual needs and desires.

Overall, technology workers evaluate three important factors when contemplating relocation to a geographic region: job offer, future career opportunities, and lifestyle. These factors take into account the offered job, career development, and personal lifestyle (including family impacts). Chapters 4, 5, and 6 describe each of these in further detail. These chapters also provide an evaluation of BC's strengths and weaknesses relative to each factor.

4. JOB OFFERS BY BC COMPANIES

The explicit elements of a job offer include salary and benefits. The difference between the offered salary and various costs determine the net disposable income. These costs include housing, cost of living, and taxes (Section 4.1). Benefits are also a key part of the job offer (Section 4.2).

A job offer also involves how a potential employee feels about the opportunity. This includes an evaluation of the excitement associated with the work (Section 4.3) and how well the company is managed (Section 4.4).

4.1 Employee Net Disposable Income

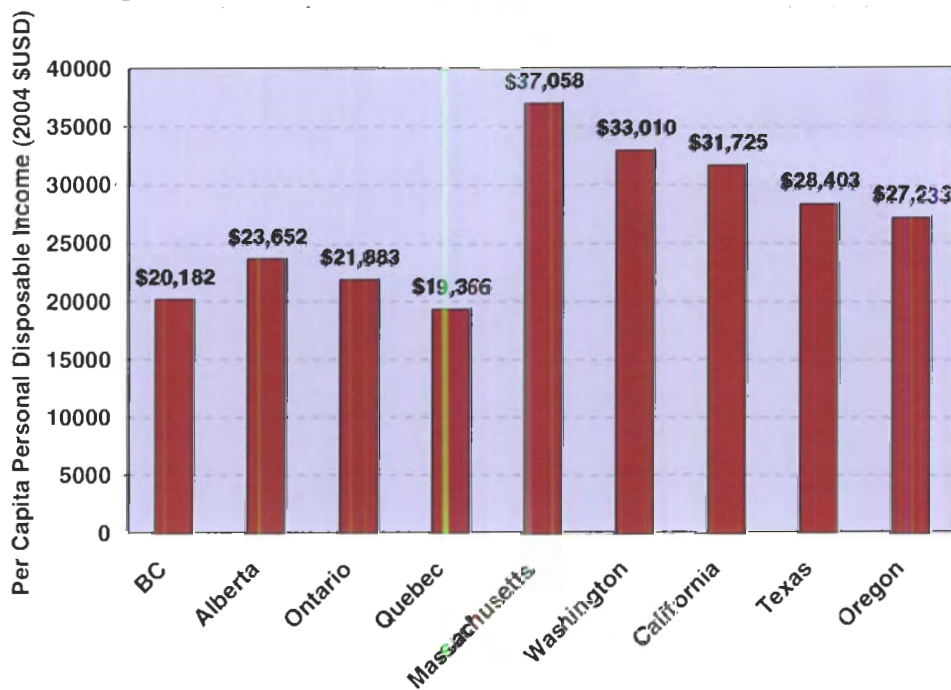
Tangible compensation is an important part of the job offer. 36% of managers surveyed in a McKinsey study identified substantial wealth creation as a critical item of their decision (Michaels et al., 2001, p. 45). Ramsay (2004) identifies competitive remuneration as a key factor in attracting top performers.

One quantitative method for evaluating competitive compensation is to examine the resulting net disposable income. Net disposable income is compensation minus the costs of housing, living, and taxes. Gottlieb (1994) conducted a survey of important factors for companies considering choices of location. Cost of housing and cost of living were the #2 and #3 items, in order of importance. These factors are important to the surveyed companies because of the impact to recruiting and retention. This is consistent with the emphasis by recruits on net disposable income.

Almost all of the interviewees cited BC's low net disposable income versus other geographic regions as a significant impediment to recruiting. This is a primarily because of lower wages and a higher cost of housing in BC. This combination has been a detriment to recruiting for a number of years (Darcovich, 1999).

Figure 2⁴ provides net income comparison between BC and several other geographic regions. Figure 2 suggests that employees generally do not relocate to BC based upon receiving higher income. Furthermore, the figure suggests net income cannot be used as a basis to attract technology workers to BC.

Figure 2: Personal disposable income is lower in BC than many other geographic regions



Data Source: BC Progress Board (2005, p. 178)

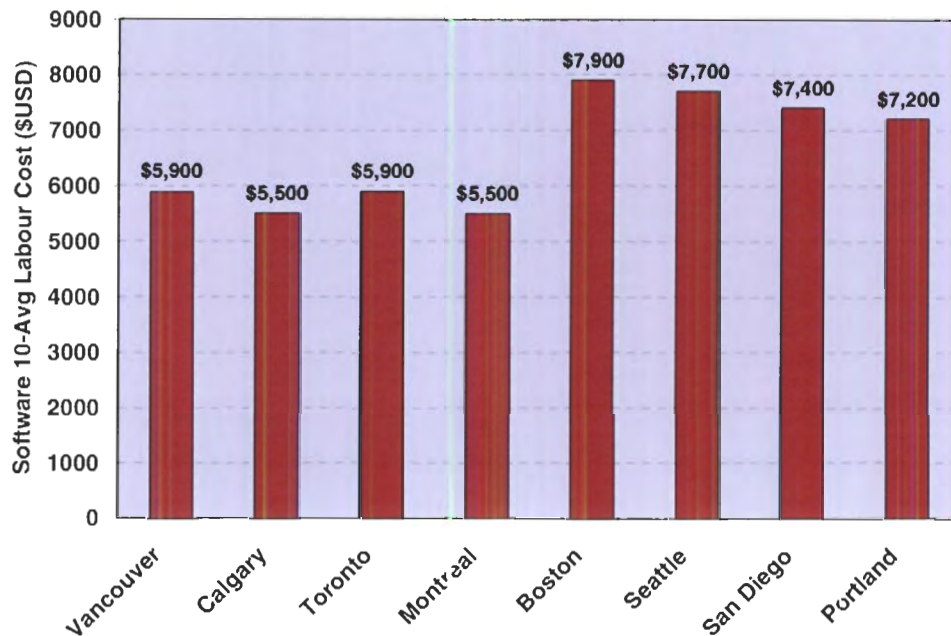
⁴ It should be noted that Figure 2 uses "per capita" income. This includes income for all workers, not just technology workers. Thus, there may be some variances when comparing only technology workers. However, the interviews and subsequent analysis indicate Figure 2 is generally an accurate comparative picture.

The BC Progress Board concluded that residents of California, Washington, and Oregon do better than all Canadian provinces in disposable income (BC Progress Board, 2005, p. 37). The disposable income difference between BC and these regions ranged from \$7,325 to \$12,344.

The Progress Board also compared BC to the sub-national jurisdictions in North America. Sub-national jurisdictions are the ten Canadian provinces, the fifty U.S. states, and the District of Columbia. BC ranked behind all of the U.S. states and the District of Columbia in net disposable income. BC also ranked behind Alberta and Ontario, but ahead of Quebec. This agrees with interviewees' experiences. For example, one recruit suggested that Seattle is 25% cheaper than BC. Figure 2 demonstrates that this number may actually be somewhat higher.

The interviewees consistently reported lower salaries as a reason for lower net disposable income in BC. A labour cost model developed by KPMG generally agrees with the interviewees. Vancouver salaries are comparable to other Canadian cities, but substantially lower than many U.S. cities (Figure 3). However, some interviewees disagree with the comparisons to Calgary and Toronto. These interviewees indicated BC salaries are significantly lower. The most likely explanation is that individual salary offers vary greatly between companies and positions. One interviewee suggested that key performers are paid better in BC than in Calgary and Toronto. Thus, the "perception" of salary differences may be dependent on the skill level of the recruit.

Figure 3: Vancouver has similar salaries to other Canadian cities, but significantly lower salaries than several U.S. cities



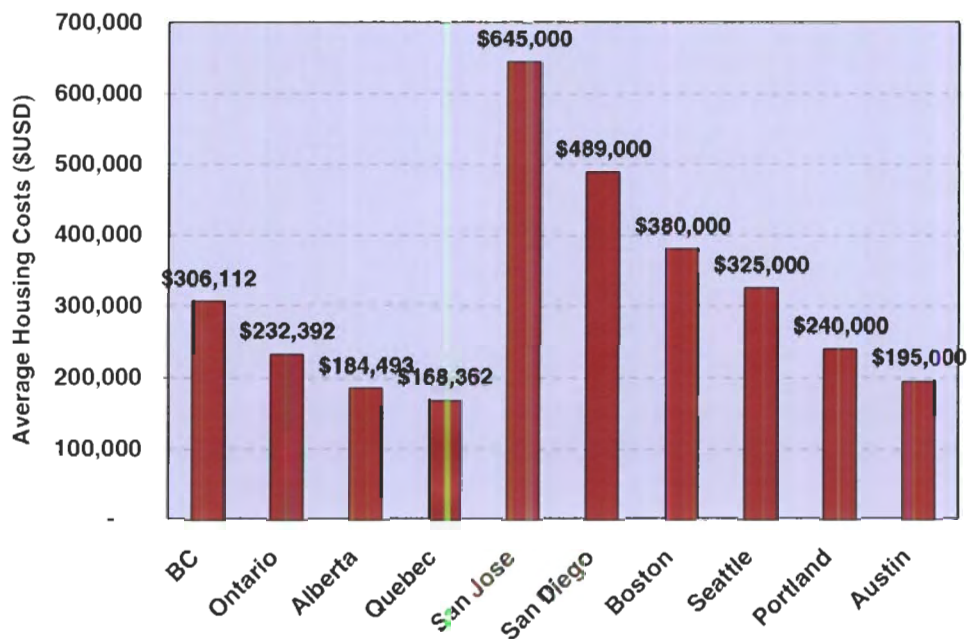
Data Source: KPMG (2005).

Interviewees also referenced higher housing cost in BC as a reason for differences in net disposable income. Anecdotal evidence suggests that housing is not a concern in relocating employees from the western United States. This is an issue when relocating employees from other regions (including other Canadian provinces). Figure 4 confirms the interviewees' experience.

Income tax also affects net disposable income. Comparisons of income tax across jurisdictions are difficult due to difference of tax structure and philosophy. For example, the United States allows mortgage interest deduction. Canada does not allow this type of deduction. As another example, Washington State does not have state income tax whereas BC has both federal and provincial taxes. Interviewees also cited

challenges of recruiting from Alberta. Alberta has a lower top marginal personal income tax rate than BC and does not have a provisional sales tax. BC compares favourably in taxation to most other Canadian provinces, except for Alberta (BC Progress Board, 2005, p. 58). Generally, interviewees believe taxes are lower in the United States due to a broader range of allowable income tax deductions.

Figure 4: BC has the highest cost of housing among Canadian provinces, but compares favourably to some regions in the United States

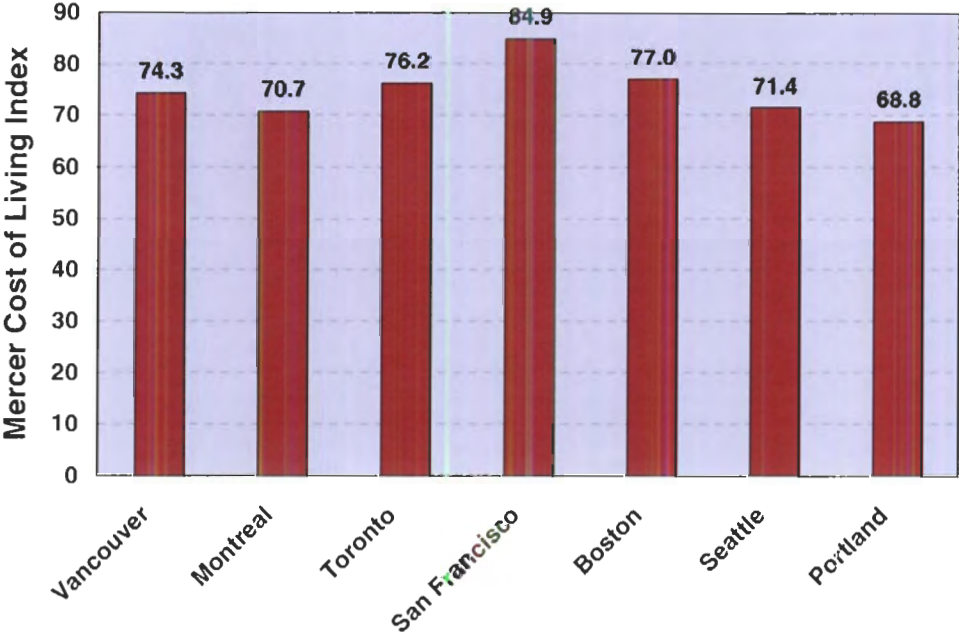


Data compiled from: Canadian data from Holt (2005). U.S. data from National Housing Conference (2005).

A positive for BC is that the cost of living (excluding cost of housing) is similar to many other areas. Figure 5 provides a comparison for some geographic regions, based on a 2005 cost of living survey by Mercer. This survey considers factors such as alcohol and tobacco, clothing and footwear, domestic services, food at home, food away from

home, health and personal care, household supplies, sports and leisure, transportation, and utilities. Cost of living is on par with most other geographic regions.

Figure 5: The cost of living in Vancouver is similar to other North American cities



Data Source: Ireland Business & Finance portal (2005).

This section concludes that BC has a lower net disposable income than almost any other technology region in North America. This is a serious weakness for recruiting. Interviewees cited this as the top reason for rejected BC job offers. Various factors account for this difference, depending upon where a potential employee is currently residing. The dominant factors are low salaries and higher cost of housing in BC. BC offers a cost of living (excluding housing) that is similar to many other geographic regions.

4.2 Employee Benefits

Net disposable income examines the differences between salaries and other costs. This income is a key tangible part of the job offer. Benefits are another tangible element of the job offer. Key benefits include health care and leave.

Generic comparison of employee benefit plans across jurisdictions is difficult, given that the plans are company-specific. This has become even more difficult as companies have moved to flexible benefit plans (Dessler, Cole, & Sutherland, 2005, p. 422). In these programs, employees pick their own benefits. This reflects the notion that the value of specific benefits varies from person to person.

Health care is often the key item in a benefit package. Interviewees cited a number of perceived negatives about Canadian health care, particularly from Americans. The inability to buy additional health care (if desired) is disturbing to Americans. Wait times have also been a huge concern, called a “detriment to recruiting” (Zehr, 2005). Additionally, significant concerns exist about the perceived lack of quality in Canadian health care. Finally, many Americans do not understand some of the benefits of Canadian health care. This is due to a lack of understanding of Americans’ own plans. For example, many Americans did not know that most U.S. health care plans have a cap on total expenditures by the company. This is not true with the Canadian health care plan. The Canadian plan can be very attractive in the event of a catastrophic long-term illness. Other indicators such as population coverage, per-capita health care spending, life expectancy, and general health also indicate the strength of the Canadian health care system (Heath Care Systems, 2001, p. 4 - 17). However, these facts are not well understood by Americans.

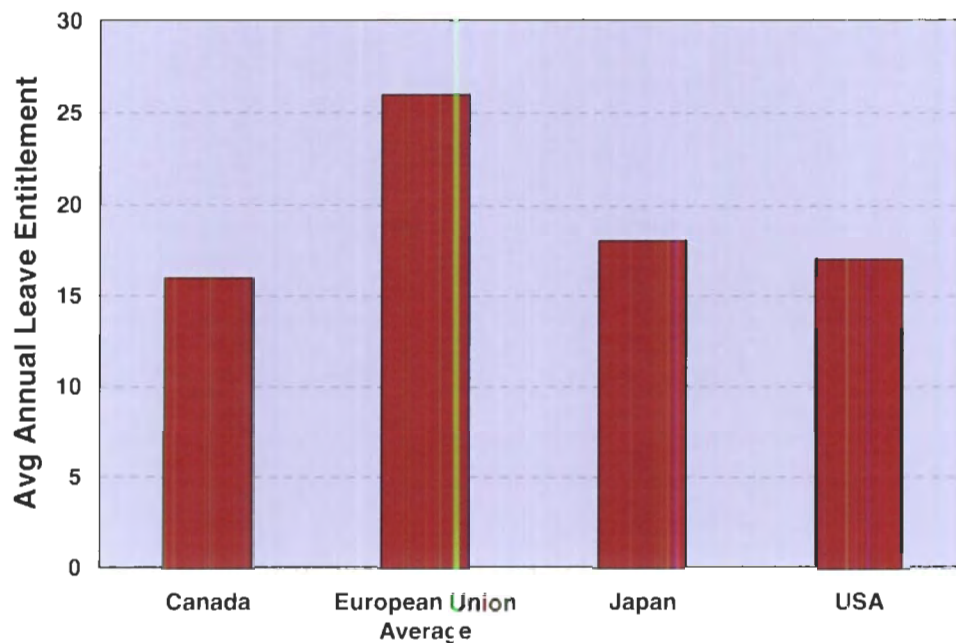
A lack of easily available sources of information regarding BC health care is a problem for recruiting. Credible resources that compare BC medical to “typical”

American plans are also lacking. One of the most easily available sources on Canadian health issues versus the United States is Sanmartin, Ng, Blackwell, Gentleman, Martinez, and Simile (2003). The Sanmartin report indicates very little difference in issues such as unmet health care needs and satisfaction with doctor services. However, Canadians indicated a lower degree of satisfaction with their overall health care services when compared to Americans. This may reinforce the concern Americans have about the Canadian health care plan. However, this is balanced by the fact that fewer Canadians feel that the health care system needs to be completely rebuilt (Health Care Systems, 2001, p. 18).

Vacation time is particularly an issue when recruiting from the European Union (Figure 6). The EU has almost two weeks additional mandatory leave. Only one interviewee identified issues with vacation time when recruiting from the United States. However, the interviewee commented that net disposable income issues usually overwhelm vacation issues.

Interviewees suggested that Canadians do not fully consider the cost of benefits when examining a move to the United States. The cost of health care and differences in mandatory maturity leave can introduce unexpected expenses. Canada mandates significantly higher maturity leave compared to the U.S. Interviewees cited the lack of easily available information on this topic as a reason these costs are often not considered.

Figure 6: The European Union has substantially higher mandated leave days than North America and Japan



Data compiled from: de Wolff (2003, p. 62) and Dessler et al (2005, p. 402)

The key finding of this section is that comparison of benefit programs can only be done on an individual basis. It is especially difficult comparing Canada's national health plan to company-specific U.S. health plans. Misperception about the Canadian health care system is a recruiting impediment when recruiting from the United States. There are also differences of health care philosophy that create some anxiety with Americans. Interviewees suggest this is not a major issue when recruiting from other parts of the world. Finally, large differences in mandatory time off are an issue when recruiting from the European Union.

4.3 Ability to Offer Exciting Work

The previous sections have dealt with the tangible part of the job offer – income and benefits. There are also perceptions about the job offer that are important to technology workers. The McKinsey study indicated interesting/challenging work is critically important to potential employees (59% of respondents). This was the top response in the study. The third highest response was work that employees could feel passionate about (45% of respondents). The Association of Canadian CEOs indicates many workers desire “opportunities to work with leaders in a field, to be part of an industry’s cutting edge” (D’Aquino and Stewart-Patterson, 2001, p. 164). This indicates that participating in exciting work is a fundamental consideration for future employment.

BC has the presence of world-class work. Table 3 provides a few examples of the kind of activities that could be exciting to potential employees. BC has world-class leadership in gaming and fuel cells. BC also has commercial success in the biotech cluster. Worldwide large-scale distribution of several different products demonstrates a strong reputation in the international marketplace

One of the issues identified by several interviewees is the lack of a single place (internet site or document) that conveys a sense of excitement about BC technology. As one interviewee said, “Canadian’s do not like to brag about themselves. This is particularly a challenge when trying to convey to a potential employee some of the technology firsts that make BC special”. The data shown in Table 3 is a good example of this problem.

Table 3: There are many examples of exciting work within BC technology companies

“...are among the world’s first profitable biotech companies”

“pioneering drug... approved for sale in Europe and in the U.S. surpassed U.S.\$1.6 billion in September 2004, one of the most successful commercial launches in medical history”

“...agreement with its alliance partners enables it to focus on research, development and manufacture of fuel cell stacks while DaimlerChrysler and Ford undertake research, development and manufacture of the vehicular fuel cell system components (balance-of-plant technology) and vehicle integration”

“...the first company to integrate LED lighting with high-efficiency solar power”

“...introduced the first high-speed commercial computer-to-plate (CTP) device...is the largest independent supplier of prepress systems in the world”

“...world leader in protecting businesses against viruses and spam...Over 25 million users from organizations of all sizes are protected”

“...operates via two networks with a combined digital coverage of 93% of the Canadian population”

“...the world’s largest development studio for interactive entertainment and its Burnaby location is the headquarters for development studios. Of ... U.S.\$2.96 billion fiscal 2004 revenue, ... accounts for approximately one-third”

“...recognized as a CG animation pioneer having developed the groundbreaking internationally distributed television series ‘ReBoot’”

“...only company in the world supplying ultraviolet disinfection equipment meeting FAA aircraft equipment standards”

“By combining information obtained from Earth observation (EO) satellites with other data sources such as climate/field data, baseline geographic information, and Internet-based information, RADARSAT has built a global client base”

“...install base of more than 61,000 wireless mobile data devices and 174 wireless data systems in 31 countries”

Data Source: Leading Edge BC (2005a).

Although the information in Table 3 is from a single source, the examples are difficult and time consuming to locate. A potential employee might expect to find this information on the web sites of the various industry associations. These sites tend to have descriptive information about the clusters. Many sites do not have the types of “exciting” information portrayed by Table 3.

The key message of this section is the large number of reasons for recruits to be excited about BC’s technology clusters. There are many technology firsts, as well as international distribution of BC technology products. However, information is difficult to locate.

Management effectiveness of BC leaders also influences perception about a job offer. This is because well run companies tend to offer stability. Furthermore, the potential for long-term investment is stronger if leaders have provided strong returns to investors. The management effectiveness of BC leaders is discussed in the next section.

4.4 Management Effectiveness of BC Companies

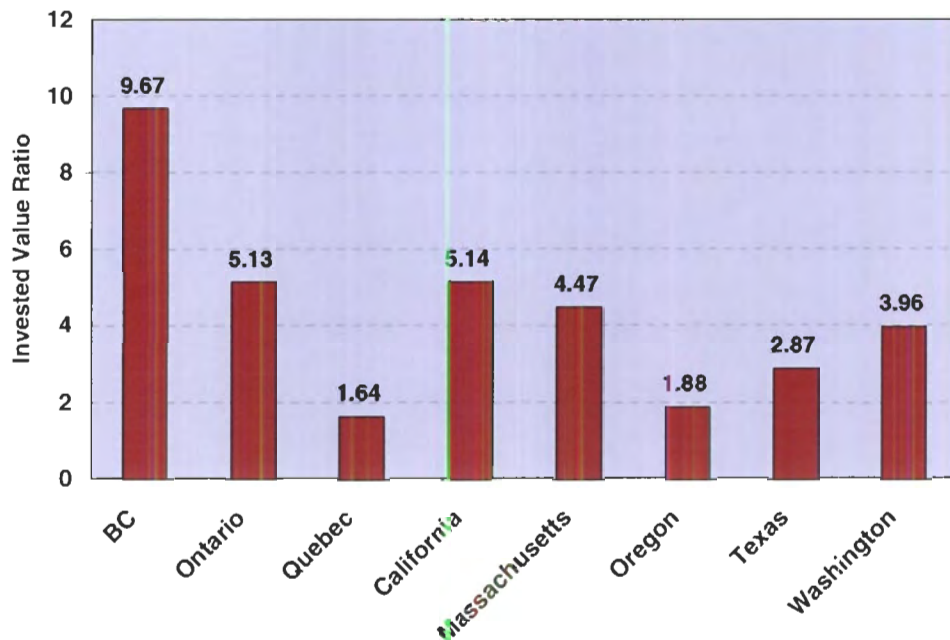
A well-managed company was the fourth highest response (48%) from the McKinsey survey. A primary consideration of top performers is joining companies that have the “reputation for delivering excellence” (Ramsey 2004).

Analysis of returns to shareholders is one method of evaluating BC management effectiveness. Greenstone Venture Partners and Leading Edge BC examined 2,200 North American companies (Greenstone Venture Partners, 2005). Greenstone examined the ratio between the total enterprise value at exit and the total venture capital (VC) dollars invested. This is the Invested Value Ratio (IVR).

Figure 7 displays some of the Greenstone study results. These results demonstrate that “BC entrepreneurs have made more with less” (Greenstone Venture Partners, 2005, p. 9). This indicates BC is a strong geographic region for investor returns. This, combined with key financial performance such as having some of the world’s first profitable biotech companies, validates the strong management of BC companies.

Investors have proportionally made more money from BC companies than many other high technology regions in North America. This is important to potential employees, because it emphasizes the management effectiveness of BC companies. Management effectiveness implies the potential for long-term job stability. This also offers confidence in BC leaders’ ability to meet long-term goals.

Figure 7: BC companies provide strong returns to investors



Data Source: Greenstone Venture Partners (2005, p. 8).

4.5 Summary – BC has Low Net Income, Exciting Work, and Well Managed Companies

The job offer is an important consideration in a technology worker's decision to relocate. The tangible part of the offer includes salary and benefits. Technology workers also consider the excitement of the work, and the management of the company.

BC has exciting work. BC also has well managed companies, evidenced by return to investors. Benefits offered by BC companies can be a strength or weakness. This depends upon the recruit's current geographic region. BC typically offers lower net disposable income than other geographic regions. This results in a trade-off: lower income, for exciting work in well managed companies. Interviewees have suggested that lower income is usually the #1 factor for rejected BC job offers. A lack of easily available information is a major impediment to recruiting.

This lower net income places tremendous importance on the evaluation of future career opportunities. Career advancement and skill improvement are possible ways to offset the lower income. The next chapter explores BC's ability to attract employees based on future career opportunities.

5. FUTURE CAREER OPPORTUNITIES IN BC

Career advancement opportunities and building skills are important concerns in the relocation decision. BC interviewees also identified career growth and training as key considerations for recruits. One interviewee pointed out: “we are asking candidates to relocate their families and careers – we can never lose sight of that”. Thus, there is also an element of evaluating the risk of a geographic relocation. This risk is for loss of a job or dissatisfaction with an employer.

Workers feel they will change employers at least three times in 10 years. Thus, they will not generally move to an area that does not have enough job opportunities (Florida, 2005, p. 151). Potential advancement within the company and within the region is considered when evaluating a relocation decision.

Florida also suggests that high technology concentrations and innovations are important for attracting technology workers (Florida, 2005, p. 37). . BC recruiters and companies were almost unanimous in suggesting that workers consider an entire region when determining whether a job has future career opportunities.

Recruits evaluate future career opportunities in several different ways. These include the overall technology employment base (Section 5.1), R&D expenditures (Section 5.2), entrepreneurship (Section 5.3), industry support to the clusters (Section 5.4), government plans for cluster growth (Section 5.5), and availability of post-secondary education (Section 5.6).

5.1 Employment Size of the BC Technology Cluster

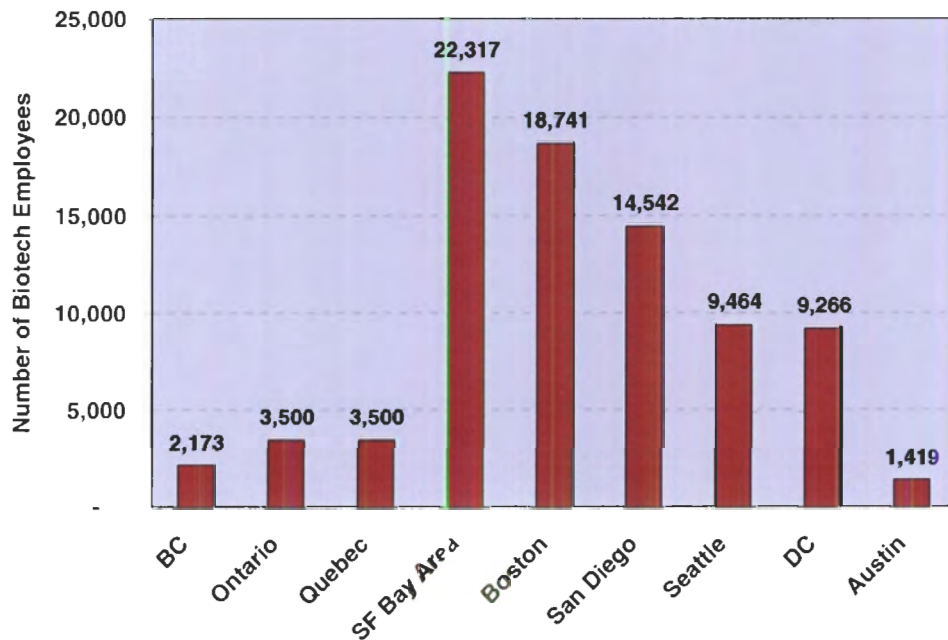
The physical size of the cluster matters to recruits. Size signals potential opportunity. This is especially a concern among mid-level managers and higher (Zehr, 2005). The relative percentage of technology workers in a region is also important (Sommers & Carlson, 2000, p. 7).

Interviewees were almost unanimous in identifying the BC employment base as a key issue in attracting employees. This is as important as compensation to many potential employees. The concern was that the ability to switch jobs in BC in the event of a layoff or job dissatisfaction.

The impression is that BC is a small market. Figure 8 shows the employment data in the biotech cluster, one of BC's strongest and fastest growing clusters. The biotech cluster is relative small in Canada, and still smaller by U.S. standards. This makes the risk higher in moving to BC than to other geographic regions.

On a regional comparison, Miller (2002, p. 2) gives the number of technology workers in Austin at 115,000. This compares to 80,000 technology workers in BC (Leading Edge BC, 2005g). However, Austin's technology workers represent 20% of the total employment base. BC's scientists and engineers represent 6% of the total employment base (BC Progress Board, 2005, p. 7). This again emphasizes the small relative size of the BC technology clusters.

Figure 8: The BC Biotech cluster is one of the smallest in North America

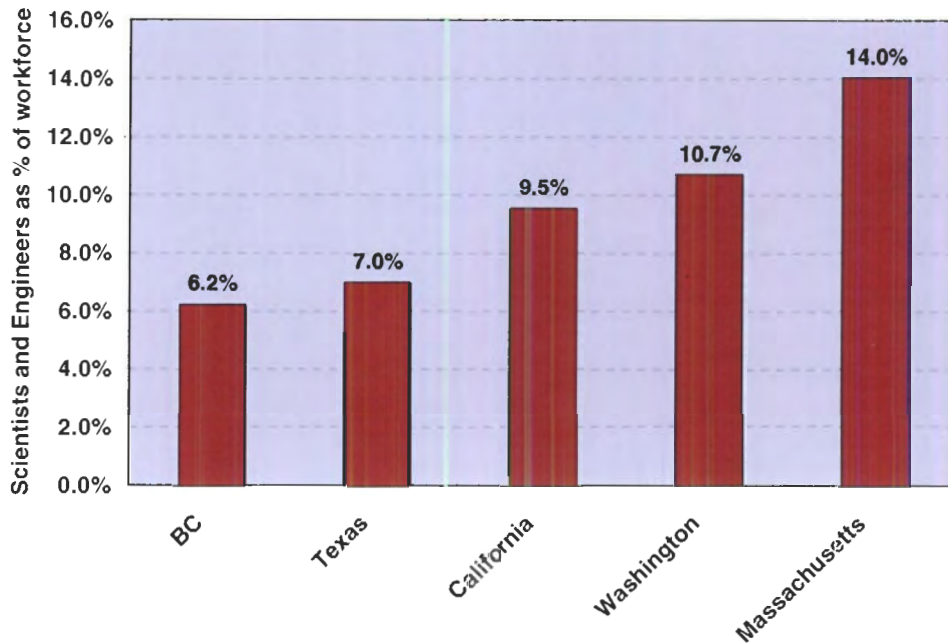


Data compiled from: Canadian data from Statistics Canada (2005). U.S. data from Devol, et al., (2004, p. 95).

One source suggests that Vancouver has more technology workers than Seattle and as many as Atlanta (Breen, 2005, p. 70). However, the total employment of scientists and engineers as a percentage of the workforce is consistently lower in BC than most U.S. states (Figure 9). Although the data from the United States is from 1999, the National Science Foundation is using this data for 2004 indicators. This suggests that the percentages have not appreciably changed. BC ranks 40th when compared to U.S. states.

Interviews suggest that the lack of size in the technology sector is especially problematic for recruiting families where the spouse also works. It creates a risk that becomes uncomfortably high.

Figure 9: The percentage of technology workers in BC is lower than many U.S. technology centres



Data compiled from: BC data from Comparing BC's Performance (2005, p. 7). U.S. data from Science and Engineering Indicators 2004 Volume I (2004, p.3-23).

An additional factor is the relatively few number of medium to large companies headquartered in BC. Interviewees stated that this was a further indication of the small region size. Furthermore, the impression is that non-headquarters locations of these firms will generally suffer cutbacks before the headquarters location. This further amplifies the potential risk to recruits.

In summary, the BC technology clusters are small compared to other geographic regions. The total number of technology workers is fewer than most other regions. The proportional number of technology workers versus the employment base of the geographic region is also smaller in BC than most other geographic regions. This creates a high risk for technology workers considering geographic relocation.

Another measure of cluster size is the amount of R&D spending in a geographic region. This spending takes into account non-personnel costs such as facilities and equipment. The next section discusses R&D spending in BC.

5.2 R&D Spending in BC

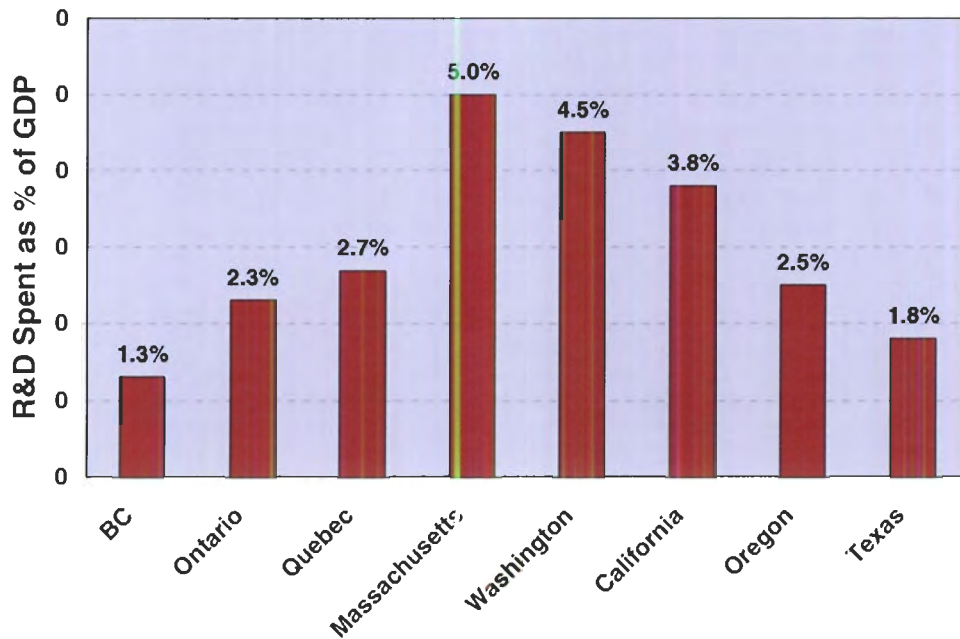
A region's research and development (R&D) spending can have a major impact on a technology worker's decision to relocate. The level of R&D spending signals the importance of R&D to a region. R&D spending can also be an indicator of future innovation and productivity (BC Progress Board, 2005, p. iv). R&D spending also reflects dollars available for non-labour investments that are important to technology workers. .

Figure 10 shows some regional comparisons for R&D spending as a percentage of Gross Domestic Product (GDP). BC ranks 38th among the 61 North American subnational jurisdictions. BC ranks 6th among the 10 Canadian provinces. Additionally, BC's R&D expenditure of 1.3% of GDP compares to 2% for all of Canada. BC ranks 19th when compared to the thirty (30) nations of the Organization for Economic Cooperation and Development (OECD). The actual R&D expenditures provide more concern for recruits. BC spent \$1.8B in R&D versus \$10.7B for Ontario and \$6.5B for Quebec (BC Progress Board, 2005, p. 81).

The BC Progress Board (BC Progress Board, 2004, p. 31) suggests that the reason for BC's low numbers is an "economy...dominated by low R&D intensive industries and an industrial structure composed of relatively few head offices". However, this is a weak argument given that BC ranks behind areas such as Nova Scotia, Tennessee, Wisconsin, and North Dakota. These geographic regions could make a similar argument. The more likely explanation (and the simplest) is that BC

lacks a strong R&D base. Many other regions have strong R&D spending via the government, academia, and/or industry. The level of R&D spending reinforces the idea of a small high technology employment base presented in Section 5.1.

Figure 10: BC spends proportionately less on R&D than many other geographic regions in North America



Data Source: BC Progress Board (2005, p. 182).

BC has some positives in R&D spending. BC has many funding mechanisms for technology business. One interviewee suggested that one of Portland's strengths was the ability to move funds from one level of government to another. Table 4 shows some of BC's funding mechanism.

BC also provides strong leverage of R&D spending via an R&D tax credit (Leading Edge BC, 2005f, p. 8). Canada has a federal incentive that allows companies to write off certain R&D expenditures and get tax credits. BC has added an additional

credit to encourage R&D. However, despite these incentives, the lack of R&D spending relative to other geographic regions is problematic for recruits.

Table 4: BC has many different mechanisms for funding high technology

BC Funding Mechanisms for High Technology
<ul style="list-style-type: none">○ BC Knowledge Development Fund (infrastructure funding)○ Michael Smith Foundation for Health Research○ Genome BC (support for research projects)○ BC Innovation Council (access and support to industry, investors and postsecondary institutions)○ Leading Edge Endowment Fund (endowed research Chairs)○ Networks of Centres of Excellence (interdisciplinary research centres)○ Operating grants to post-secondary institutions from the Ministry of Advanced Education○ Various ministries sector-specific research contracts○ The Equity Capital Program and the Community Venture Capital Program indirectly support R&D activities by providing a 30 percent tax credit to investors in eligible companies○ Telus New Ventures○ Small Business Venture Capital Act

Data Source: Personal communication on 15 Dec 2005 with Cindy Pearson (BC TIA).

The conclusion of this section is BC has substantially lower R&D expenditures than other regions. This is measured in total dollars spent, as well as the percentage of GDP. This further emphasizes the relocation risk for recruits presented in section 5.1.

Sections 5.1 and 5.2 focus on the small size of the BC technology clusters. However, many clusters start small and grow over time. Thus, recruits will also evaluate the potential growth of a cluster. A small growing cluster may appeal to many workers.

The next section discusses entrepreneurship as a measure of potential growth for evaluating technology clusters.

5.3 Entrepreneurship in BC

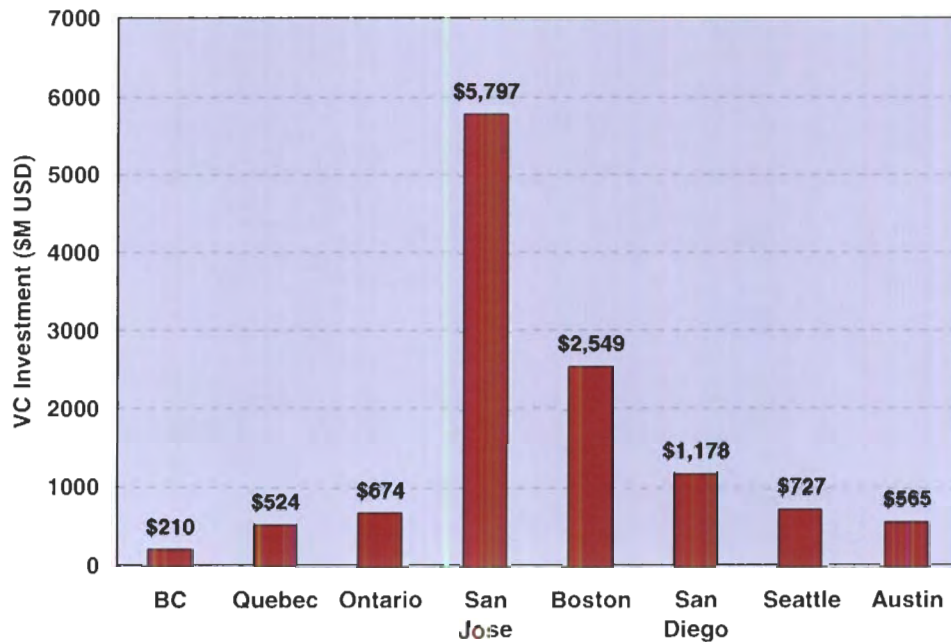
Feldman and Francis (2003, p. 784) believe that entrepreneurs are the most critical ingredient for cluster formation. “Entrepreneurship...is an essential element of regional economic growth” (Florida, 2005, p. 55). The expenditure of venture capital is an indicator of entrepreneurship. The number of new start-ups is another indicator. Additionally, patent activity also indicates a foundation for new technology development. This implies potential growth opportunities.

Entrepreneurship is important to technology workers for a number of reasons. Entrepreneurship provides evidence of knowledge development. Entrepreneurship can also signal a growing technology community. Thus, proof of entrepreneurship may overcome some concerns about the small size of a cluster. Furthermore, entrepreneurship provides evidence about the types of research and talent in a region.

Venture capital (VC) expenditure is one measure of entrepreneurship. As discussed in Section 4.4, BC provides strong returns to investors. However, Figure 11 shows that BC ranks far below other regions in annual VC investment.

Interviewees suggested that one of the strongest reasons for this difference is the lack of later stage VC financing. BC has strong financing for start-up companies. However, BC companies have generally not been able to secure extensive VC financing for taking products to market. BC companies are often purchased when ready for product launch. This partially explains the lack of head offices in BC. Recruits have cited low relative VC investment and the frequency of company acquisitions as risks.

Figure 11: BC has smaller venture capital investment than many high technology regions



Data compiled from: Canada source: Macdonald & Associates (2005, p. 11). U.S. Source: Thomson Financial Venture Economics (2005).

BC has a strong university tie to the start-up community. The number of start-up companies relative to BC universities demonstrates this strong tie (BC Progress Board, 2004, p. 17). SFU was the top university in Canada for the number of start-up companies formed per million dollars of research. The University of British Columbia (UBC) also has a strong history of spin-off companies. There are 117 UBC spin-off companies currently operating in BC. This includes 17 public companies with a market cap of \$3.2B USD (Bruce, 2005, p. 16)

The Association of University Technology Managers (AUTM) describes Canadian start-up performance in perspective to the United States. AUTM conducted a survey of 232 U.S. universities and colleges, 76 Canadian institutions, and four third-party investment companies (Stevens, Phil, & Toneguzzo, 2004, p. 1). The survey addressed

licensing of technology and related performance. One of the study conclusions was: “Dollar for dollar, Canadian technology transfer is more people-intensive, selective, cost-effective and creates more start-ups than in the United States. Using this method of comparison, Canada had 198.3 percent more start-up companies still operational at the end of fiscal year 2003 and launched 145.9 percent more products” (Association of University Technology Managers, 2005).

Leading Edge BC has also expressed the strength of BC’s connection between academia and industry. “The close collaboration of tech companies and internationally recognized universities and research centres creates a highly productive environment for innovation and technology transfer” (Leading Edge BC, 2005e). BC has a strong appeal to technology workers interested in working within a start-up company environment.

Patents are also an indicator of BC’s entrepreneurial strength. SFU ranked 2nd among the 15 Canadian universities for the ratio of U.S. patents issued per million dollars of research. The University of British Columbia (UBC) was 3rd (BC Progress Board, 2005, p. 155). Additionally, an American intellectual property consulting firm ranked UBC 9th among North American universities for the quantity and quality of life sciences patents (Schmidt, 2005). UBC’s number of patents filed in 2003 places it 11th among North American institutions surveyed by the AUTM (Bruce, 2005, p. 11). BC’s strong patent history offers proof of an intellectual environment and the creation of new potential technology.

In summary, BC has technology clusters characterized by many start-up companies. BC also generates a substantial amount of IP, particularly in the biotech cluster. This has appeal to recruits with a high interest in early stage technology. However, BC has substantially less later stage VC investment than most other high

technology regions in North America. This is an issue for recruits that are primarily interested in getting product to market. A lack of late stage investment also signals that the organic growth of BC companies may be limited.

5.4 Industry Support to BC's Technology Clusters

The previous section explored BC's future growth potential by examining VC investment, start-ups, and intellectual property. Analysis of industry and government support to technology clusters is another method of assessing future growth potential.

Formation of technology clusters with synergistic benefits is one method of demonstrating Industry support. Some of the strongest geographic regions have linked clusters (personal communication with Heike Meyer, 28 Nov 2005). For example, Washington D.C. leveraged strengths in internet services and telecommunications to the mutual advantage of both clusters. This provides a broader range of available opportunities for recruits, allowing the evaluation of job opportunities in the context of multiple clusters.

BC's technology clusters have significant synergies. Fuel cell technology is part of the energy technologies and sustainability technologies clusters. Telecommunications technology is an integral part of the ICT and wireless clusters. Companies in the ICT cluster provide services to companies in each of the other clusters. BC recruits can consider future career opportunities across multiple clusters. This has the advantage of a larger pool of potential long-term opportunities.

Active industry associations are another measure of industry support for its technology clusters. Industry associations had strong roles in the growth of regions such as Portland, Austin, and Maryland. The associations have worked on partnerships, licensing, and loans for start-ups (Feldman & Francis, 2003, p. 773). Association

activities have also included networking and promotion of products and services (Miller, 2002, p.8). Advocacy of favourable tax treatment for technology companies has also been a role for industry associations (Dodds & Wollner, p. 125).

BC has active industry associations for all of the clusters (Table 5). Activities of the associations include government advocacy, R&D funding, networking, marketing of products and services, personnel development, media relations, and dissemination of information. Several of the associations represent multiple technology clusters. This emphasizes the leverage that exists between several of the clusters.

BC has also developed initiatives specifically to support the clusters. The Integrated Technology Initiative is an example of one such initiative (see Chapter 1). The ITI has representation from industry associations (Figure 12) that encompass all of the clusters. This is an example of cluster based economic development that can be appealing to recruits.

Table 5: The BC technology clusters have strong representation by local industry associations

Cluster	Industry Associations
<p>Biotech/life sciences</p>	<p>BC Biotech - (http://www.bcbiotech.ca/)</p> <p>British Columbia Health Industries Network -(http://www.hinetbc.org/)</p> <p>British Columbia Medical Technology Industry Association - (http://www.bcmediabc.com/)</p> <p>BC BioProducts Association - (http://www.bcbioproducts.ca/)</p> <p>VanBUG (Vancouver Bioinformatics Users Group) - (http://vanbug.org/)</p> <p>Pre-Clinical Network of British Columbia -</p>
<p>Energy technologies</p>	<p>BC Sustainable Energy Association http://www.bcsea.org/</p> <p>British Columbia Wind Energy Association http://www.bcwea.org/</p> <p>Canadian Institute of Energy BC - http://www.cienergy.org/</p> <p>Community Energy Association http://www.communityenergy.bc.ca</p> <p>GeoExchange BC - http://www.geoexchangebc.ca/</p> <p>Independent Power Producers Association of BC - http://www.ippbc.com/</p> <p>Vancouver Electric Vehicle Association -. http://www.veva.bc.ca/</p>
<p>ICT</p>	<p>British Columbia Technology Industries Association http://www.bctia.org/</p> <p>New Media BC- http://www.newmediabc.com/</p> <p>Wireless Innovation Network of British Columbia - http://www.winbc.org/</p> <p>British Columbia Photonics Industry Association - http://www.jgkb.com/bcphotonics/main.html</p> <p>BC Innovation Council - http://www.bcinnovationcouncil.com/</p> <p>Western Canada Telecommunications Council - http://www.wctc.bc.ca/</p>

Cluster	Industry Associations
New Media	<p><u>ACM SIGGRAPH - Vancouver Chapter</u> - http://www.siggraph.ca/</p> <p><u>British Columbia Film</u> http://www.bcfilm.bc.ca/</p> <p><u>BC Technology Industries Association (BCTIA)</u> – http://www.bctia.org</p> <p><u>eLearning BC</u> - http://www.elearningbc.com/content/index.asp</p> <p><u>International Game Developers Association (IGDA) - Vancouver Chapter</u> - http://www.igda.org/vancouver/index.php</p> <p><u>New Media BC</u> - http://www.newmediabc.com/</p> <p><u>Wireless Innovation Network of BC (WINBC)</u> - http://www.winbc.org/</p> <p><u>New Media West</u> - http://www.newmediawest.com/</p>
Sustainability technologies	<p><u>(The) Association of Professional Engineers and Geoscientists of British Columbia</u> - http://www.apeg.bc.ca/</p> <p><u>Association of British Columbia Forest Professionals</u> - http://www.abcfp.ca/</p> <p><u>British Columbia OnSite Sewage Association</u> http://www.bcossa.com/</p> <p><u>British Columbia Environment Industries Association</u> - http://www.bceia.com/</p> <p><u>British Columbia Institute of Agrologists</u> - http://www.bcia.com/</p> <p><u>British Columbia Water & Waste Association</u> - http://www.bcwwa.org/index.php.</p> <p><u>Canadian Land Reclamation Association-British Columbia Chapter</u>. http://www.clra.ca/britishcolumbia.html</p> <p><u>Centre for Sustainable Communities Canada</u> - http://www.sustainable-communities.com/</p> <p><u>Environmental Managers' Association of BC</u> - http://www.emaofbc.com/</p> <p><u>Recycling Council of British Columbia</u> - http://www.rcbc.bc.ca/</p> <p><u>Society for Ecological Restoration British Columbia</u> - http://www.serbc.info/public</p> <p><u>Vancouver Geotechnical Society</u> http://www.vancouvergeotechnicalsociety.com/</p>

Cluster	Industry Associations
Wireless	<p>Wireless Innovation Network of British Columbia (WINBC) – http://www.winbc.org/index1.jsp</p> <p>Canada West Telecom Group. http://cwtg.ca/</p> <p>WirelessReady® Alliance (WRA) http://www.wirelessready.org/</p> <p>Western Canada Telecommunications Council (WCTC) - http://www.wctc.bc.ca/</p>

Data Source: Leading Edge BC (2005)

Figure 12: The Integrated Technology initiative demonstrates cooperation between the BC industry associations to support technology cluster growth



Data Source: Integrated Technology Initiative (2005). Logos used by permission of the ITI.

This section summarized some of the key strengths for BC's technology clusters. The clusters have extensive synergy. Companies and technology operating in multiple clusters provide evidence of this synergy. Some industry associations also represent multiple clusters. The associations provide the types of programs and initiatives for advocacy and strengthening of the clusters. Recruits view industry support to the BC clusters as a strong positive. The support demonstrates company commitment to regional long-term growth. This indicates BC companies are willing to invest their resources for improving the region.

Recruits are also interested in understanding the government plan for the regional technology clusters. This is another indicator of potential long-term cluster growth. BC's government plan is described in the next section.

5.5 Government Plan For Cluster Growth

Almost all regions with technology clusters have specific development plans. Analysis by the European Union indicated that Austin achieved success through planning. This involved having a vision for a new base to the economy, developing a plan, and implementing the plan (Miller, 2002, p. 1). A long-term strategy was a key element for development of biotechnology in the Washington DC region (Feldman & Francis, 2003, p. 769).

The impetus of a technology development plan is often an economic crisis. For example, in the mid 1980s the Austin economy began to implode. This resulted from a recession, an overbuilt real estate market, and high employment (Rapp 1998). This caused many organizations to focus on key regional issues. Finland also reacted to crisis. The collapse of the Soviet Union was devastating to Finland, as the Soviet Union was a major buyer of products and services (Rosenberg, 2002, p. 83). Federal

downsizing and a switch to outside contracting was a key reason for the upsurge of entrepreneurship in the Washington D.C. region (Feldman & Francis, 2003, p. 784). The closing of significant U.S. Naval bases motivated San Diego's diversification. Portland was also motivated to work hard on attracting technology companies due to a crisis in the wood and fishing industries (Dodds & Wollner, 1990, p. 171). A technology plan that responds to a crisis can sometimes be a positive for technology workers. This is because of the long-term motivational issues placed on the government and local industry. These issues tend to transcend government administrations, resulting in continuity of the efforts.

The BC plan for growth of its technology business is unclear. The Premier has identified a goal of becoming one of the world's top 10 technology centres. However, no definition of "top 10 technology centres" is available. Additionally, there is no readily apparent plan for accomplishing this goal. There also does not seem to be any major economic crisis that is pushing the technology cluster agenda.

Technology is also not reflected in the Premier's "The Five Great Goals For A Golden Decade". The only technology reference in the speech that defined these goals is to the Premier's Technology Council (Campagnolo, 2005). The PTC is similar to organizations established in other jurisdictions. For example, in the state of Texas, the Governor created the Texas Science and Technology Council. The council's charter is for recommending solutions to growth barriers in technology businesses (Miller, 2002, p. 13). Ireland created an Office of Science & Technology to aid in the development of private industry technology (BC Biotech, 2002). However, in Texas and Ireland there was a dedicated position within the government responsible for technology. This is also true in Canadian provinces such as Alberta, Quebec, and Ontario. Although BC has a

technology council, the lack of clear and dedicated accountability for technology within the government is a serious impediment to attracting technology workers.

The BC Progress Board is another organization designed to help the Premier with long term planning. This Board provides benchmark data on BC. The Board is also to provide advice to the Premier on improvement of provincial BC's competitive position. "They have been selected, first and foremost, for their proven ability to contribute and not because they represent any particular interest" (BC Progress Board, 2006). The Board consists of 18 members. Five members are from the investment and securities community. Four members are from the natural resources sector. One member is a university president. The other members represent businesses such as newspapers, food and drug stores, real estate, and furniture. Only one member (the former President of Yahoo!) has a clear association with the technology sector. Recruits could interpret the board representation in several ways. One possible interpretation is that technology is not a priority for the province. Another interpretation is that there are not sufficient management leaders from the technology clusters with a "proven ability to contribute". Either interpretation signifies weak technology clusters.

This section describes a major weakness for BC recruiting. The Premier has stated a goal for the BC technology clusters of being in the Top 10 in the world. However, this importance is not reflected in the Premier's key goals. The PTC appears similar to organizations in other technology clusters. However, the potential effectiveness of the PTC is unclear, given the lack of a technology plan. The lack of technology personnel on organizations such as the BC Progress Board indicates a lack of priority for technology clusters. This is a serious negative for recruits and creates serious questions about the risk of relocating to BC.

5.6 Post-Secondary Education in BC for Technology Workers

The previous sections have focused on the size and growth of the technology clusters. A source of education provides support to the labour force (Dodds & Wollner, 1990, p. 112). Employees in a region view this as an important element of retention. Additionally, this provides a needed local source of scientists and engineers.

The presence of a strong education system is particularly important in biotech. Maryland's Lieutenant Governor said, "A healthy, well financed, and daring education system is the indispensable foundation for success in biotechnology" (Feldman and Francis, 2003, p. 769).

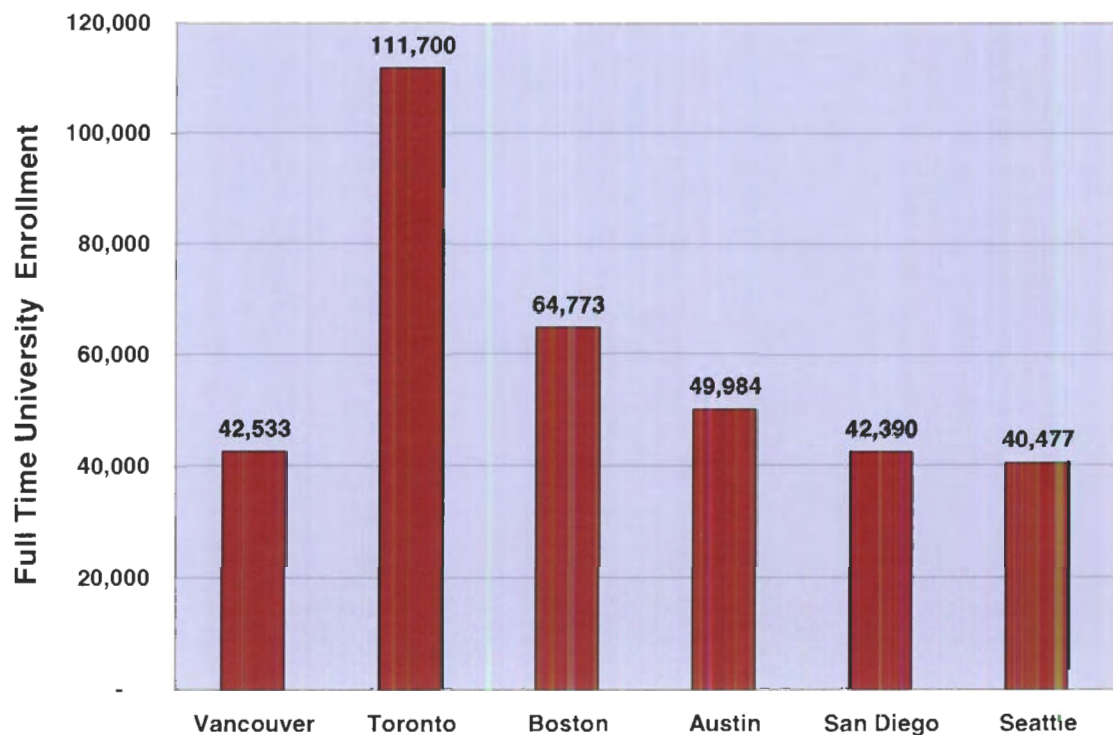
However, education has an important role in all technology sectors. For example, Austin updated its geographic strategy in 1985. A specific action plan was "realigning educational institutions to provide industry-based training and adult retraining" (Miller, 2002, p.6).

A research university can be the source of education. However, this is not necessarily the case. Portland had to address this issue, given the lack of a major university in the local area. In this case, a local company (Tektronix) acted as a surrogate university to create a specialized labour pool and high technology knowledge (Mayer, 2005, p. 318). The government of Oregon addressed the educational issue by creating programs to emphasize technology all the way to the secondary level. Furthermore, the government created a graduate business program in marketing and innovation (Dodds & Wollner, 1990, p. 121, 123). This indicates that a "world-class" educational institution is not necessarily required to attract technology workers. However, the ability to provide education in areas important to technology workers is the key consideration.

BC has a strong base for providing educational training to technology workers. University enrollment is an indicator of educational offerings in a given region. Figure 13 compares the enrollments between various geographic regions. The Vancouver area compares favourably with many other regions.

None of the interviewees identified the post-secondary education system in BC as an impediment to recruiting. Most recruits acknowledge BC universities have strong programs in math, science, business, and other related fields. However, some recruits were surprised at the few number of university-industry internship programs in BC.

Figure 13: Vancouver has similar university enrollment to several other North American cities



Data compiled from: Vancouver data from The University Presidents' Council of BC (2005). U.S. data from U.S. City Information (2005). Toronto data from Association of Universities and Colleges of Canada (2005).

Overall, BC does not have the internationally recognized universities that exist in some geographic regions. However, the lack of these types of universities has not impeded growth in other high technology regions. BC has the types of programs needed for improving the education and training of technology workers. BC also has university enrollment indicative of a region dedicated to advanced education. There is strong connectivity between BC universities and some of the BC technology clusters. This provides a strong appeal for some technology workers. The lack of internship programs may be a weakness. However, interviewees did not cite this as a reason for rejecting BC job offers.

5.7 Summary – Future Career Opportunities in BC Are a Serious Concern For Recruits

BC has small technology clusters, compared to many other geographic regions. BC also has low R&D spending. BC has tremendous strength in creating intellectual property and starting companies. However, BC lacks venture capital for later stage financing. BC industry associations provide strong support to the clusters. This is offset by the lack of a government technology growth plan.

BC can be very appealing to the recruit interested in start-up companies and/or new technology. A strong foundation exists from the local universities and industry support to the clusters. However, relocation to BC is extremely risky because of the cluster size and lack of a technology growth plan.

6. LIFESTYLE IN BC

The previous chapters have focused on the work life of a recruit. Lifestyle reflects impacts to the personal life of a recruit. Lifestyle also indicates things of importance to the employee's family. In Gottlieb's survey of companies, several items related to lifestyle appeared in the top priorities. These include environmental quality, schools, commute, recreational and cultural amenities, climate, and public safety (Gottlieb, 2005). Florida (2005, p. 61) has performed quantitative analysis demonstrating "a relationship between environment quality, high-technology industry concentration, and talent". Florida (2005, p. 7) also found a direct positive correlation between diversity/tolerance and high-tech growth in Canadian regions.

6.1 Living Conditions Reflect Environmental Quality, Amenities, and Life Expectancy

Living conditions are a strong attraction for recruits. Vancouver was ranked 1st by The Economist Intelligence Unit when examining living conditions in 127 cities around the world⁵. Birth and life expectancy data reinforce this ranking. BC ranks 3rd best in North America for low birth weight of infants (BC Progress Board, 2005, p. 16). BC ranks 2nd in life expectancy compared to countries from the OECD (BC Progress Board, 2005, p. 16). These are strong positive indicators of health and social condition.

Environmental quality is another measure of living condition. BC is #1 in the world on an environmental index that averages performance on urban air quality, wastewater treatment, greenhouse gas emissions per capita, and protected areas (BC

⁵ (http://store.eiu.com/index.asp?layout=pr_story&press_id=660001866&ref=pr_list). Retrieved December 2, 2005.

Progress Board, 2004, p. 90). Environmental quality is augmented by BC's climate and geography. The natural beauty of BC has a particularly strong appeal, according to interviewees. However, Americans sometimes confuse the geography of Vancouver with the rest of Canada – assuming Vancouver is “cold and snowy”. The strong name recognition of Whistler also contributed to this confusion.

BC's geography allows a broad spectrum of recreational amenities. The Economist survey scored Vancouver among the best in the world in this category. Natural geography allows diverse activities such as water sports and skiing within a very short distance. This is a weakness in some technology areas such as Austin (Miller, 2002, p. 16). Furthermore, the large number of cultural amenities is a strong positive to recruits.

BC living conditions are one of the strongest attractions for recruits. Environmental quality, recreation and cultural amenities, and life expectancy are among the very best in the world. Interviewees indicated this is a strongest positive for recruits contemplating relocation to BC. Living conditions are also a strong attraction for family members.

6.2 Schools Are Important to Recruits With Children

Recruits with children are also concerned about the quality of schools. BC schools fare very well on the Program for International Student Assessment (BC Progress Board, 2004, p. 75). BC ranked #2 in reading, #4 in math, #5 in science, and #5 in problem solving. Overall, BC ranked #3, behind only Finland and Korea. In comparison, the United States ranked #19 in reading, #28 in math, #23 in science, and #30 in problem solving.

The BC academic results contrast with some interviewees' experiences. Several interviewees reported a concern (particularly from Americans) that BC schools were substandard. This is entirely due to incorrect perceptions and lack of information. Furthermore, interviewees stated that Canadians moving to the United States sometimes underestimate the cost of schooling. The combination of quality and safety concerns with U.S. public schools sometimes causes Canadians to place their children in private schools. This results in an unexpected cost.

Safety is not only an issue when examining schools. Safety is an important consideration for all recruits. Safety concerns are especially important for recruits with families. Safety in BC is discussed in the next section.

6.3 Public Safety Includes Violent Crime and Property Crime

Interviewees suggest many companies try to create the image of BC being a safe place to raise families. Quantitative data presents a different image. Vancouver has the highest combined violence-and-property crime rate of any major city in North America (BC Progress Board, 2005, p. vii). Vancouver has a lower rate of violent crime than any U.S. city, with the exception of Boston.

Interviewees urged caution about using public safety data to attract Americans. Given the high value placed on personal property, some Americans may view Vancouver's crime statistics as a huge negative. However, the high violent crime rates in the United States may be a strong rationale for encouraging Canadians to stay in Canada.

6.4 Tolerance Reflects Regional Diversity

Lower crime rates are often associated with regions that have a high degree of tolerance for different racial groups. This implies a high degree of ethnic and social diversity. Richard Florida developed a mosaic index that measures population diversity. Vancouver has the 2nd highest score in North America (Florida, 2003, p. 5). Only Toronto scores higher in North America. This is a substantial strength for BC, in creating the image of being a tolerant and accepting location for immigrants. This may be a weakness for some cities such as Austin. Austin has the highest racial income inequality of all comparable regions in the U.S. (Miller, 2002, p. 16).

6.5 Summary – BC Lifestyle Has Strong Appeal To Recruits

BC offers a clean environment, combined with a moderate climate and beautiful geography. BC schools are among some of the best in the world, as evidenced by international standardized testing. BC also has a very diverse population. This provides appeal for attracting talent from all over the world. BC also has one of the lowest violent crime rates in North America. This is contrasted with BC having the highest property crime rate in North America. Despite this negative, lifestyle is the top reason for relocating to BC.

7. REGIONAL RECRUITING STRATEGIES

The previous chapters describe how a recruit might evaluate a decision for relocating to BC versus staying in the current location. However, many other regions are trying to attract the same talent. The following sections describe features of the recruiting strategies of other geographic regions. This is an important competitive consideration for recruiting talent to BC.

7.1 Better Incentives and Salaries

Several Canadian provinces have adopted aggressive incentives to attract technology workers. The Ontario Research Employee Stock Option (ORESOS) plan provides refunds of some taxable income each year from taxable stock options (BC Biotech, 2002, p. 25). Quebec has tax exemptions for foreign researchers (Promoting Growth of the Biotechnology Industry, 2002, p. 27). BC also has programs for provisional income tax exemptions for individuals skilled in international finance. Alberta is making extensive use of sign-on bonuses to attract employees (personal discussion at the Human Capital Institute symposium, Dec 2005).

United States jurisdictions have a strong history of adjusting to market conditions. For example, when Austin experienced shortages of software engineers and senior manager with marketing skills, industry adjusted salaries to bring them into line with national averages (Rapp, 1998). Additionally, Austin offered subsidized home loans and job hunting assistance for spouses after winning the competition for the Microelectronics and Computer Technology Corporation (Miller, 2002, p. 13).

7.2 Technology Circles Emphasize Geographical Networking

Increased salaries and incentives focus on making an effective job offer.

Regions are also using strategies to emphasize long-term career opportunities. One strategy is the technology circle concept. Toronto and Ontario are using this approach. This concept emphasizes multiple companies appearing together in job fairs and other industry meetings. This has the benefit of making the clusters appear to be larger, more integrated, and supportive of the local economy and employees. One CEO reported using this concept to reinforce the idea that the city was networked, and people supportive of one another (Rapp, 1998). These technology circles attempt to make the technology cluster look more significant than its physical size as measured by employees and revenue would indicate. This is done by emphasizing connectivity and leverage between the clusters. These regions are sending strong positive messages about long-term career opportunities.

7.3 Brand the Geographic Location

Technology circles focus on communicating regional cooperation and unity. “Place branding” also unifies important regional messages (Taylor, 2005). Geographic regions are trying to sell their images, in a way that is similar to strategies used by companies for product branding.

Waterloo and Ottawa are examples of Canadian cities that are using place branding to communicate the benefits of the city to specific audiences. Waterloo is branding itself as the “best place in Canada to invest” (PriceWaterhouseCoopers, 2005). Waterloo claims high marks in shareholder value, internal rate of return (IRR), and the number of technology initial public offerings (IPOs) for firms that locate there. The

Waterloo report does have some factual errors about BC. Interviewees noted there is no obvious place on the internet to critique reports by other regions.

Ottawa has leveraged the city's collaboration to launch TalentWorks (www.talentworks.ca) which aims to integrate the city's various human resource (HR) initiatives. One of the current (2005-2006) programs is an online survey. This survey is asking about opinions on workforce issues and priorities. Thus, Ottawa is attempting to brand the city as an "employee-friendly" geographic region.

Many regions have also used their natural beauty and their low cost of living as methods of branding their locale. Dublin (Breen, 2005, p. 70), Portland (Dodds & Wollner, 1990, p. 56), and Austin (Miller, 2002, p. 14) are all cities that have used this branding to attract technology workers. Portland suggested that companies use a theme of "a touch of urbanity" to attract employees (Dodds & Wollner, 1990, p. 61).

Nashville is a city that is not well known for its high technology employment. However, it has launched an aggressive campaign to attract technology workers. Nashville's branding is using Richard Florida's concepts (Memphis Talent Magnet Project, 2005). Nashville expects to launch a new web site and conduct media advertising. Extensive leverage of Nashville's cultural amenities will be used as part of the branding.

Place branding has the advantage of bringing together the separate activities of industry associations, tourism bureaus, and other related department (Taylor, 2005). This provides an integrated set of messages to potential recruits. Consistency is also an important benefit of place branding.

7.4 Increase Academic Attraction

The previous sections demonstrate focus on improving job offers, emphasizing future career opportunities, and attracting recruits by utilizing a consistent brand. Regions also recognize that universities are sources for attracting and creating talent (Florida, 2005, p. 152). Ontario and Alberta have announced plans to expand graduate education as part of their 2005 budget submissions (personal communication with Don Avison on 31 Oct 2005). This may widen the existing gap between BC's graduate enrollment per capita versus the national average (Statistics Canada, University Enrollments, 2001/02 headcount).

Many U.S. geographic regions utilize research chairs as a major strength. The total of Canada's business schools fully funded research chairs with an endowment of \$2.5M or more is lower than some single U.S. institutions. These chairs are critical for driving research performance, according to the Canadian Council of CEOs (D'Aquino and Stewart-Patterson, 2001, p. 166). The University of Texas at Austin has effectively used these chairs for attracting new business. These have included creation of endowed chairs in engineering and science. Austin has also offered fellowships and teaching positions to recruits (Rapp, 1998). The University President's Council has indicated a widening gap between BC universities and other Canadian universities in the funding of R&D, particularly research chairs (personal communication with Don Avison on 10 Feb 2006).

Geographic regions recognize the importance of attracting talent via the post-secondary system. This talent often become the foundation for generating IP, and creating new companies. This can help further the growth of technology clusters (Section 5.3).

7.5 Design Custom Recruiting Programs for Expatriates

Canadians that have left Canada are a recruiting target for some provinces. Alberta has developed extensive programs to attract expatriates (expats) from the U.S. The Alberta Economic Development organization, Alberta Innovation and Science and the Canadian Consulate in Los Angeles have formed joint programs to recruit expats from Silicon Valley. This consists of educating expats about opportunities in Alberta, as well as leveraging the dot.com crash (Bolan, 2001).

Ontario has also targeted expats (Sutton, 2005). Ontario is sponsoring picnics in Silicon valley. Ontario is leveraging the alumni network to encourage expats to return to Canada. Improvements in the Ontario job market, as well as political concerns about the current U.S. administration, are being used as enticements for expats.

Interviewees have also suggested that expats are a primary recruiting target for BC companies. However, the key issue has been availability of appropriate jobs in BC.

7.6 Summary – Geographic Regions Are Using Diverse Strategies To Attract Recruits

Geographic regions outside of BC are using defined strategies for recruiting. These strategies provide improved job offers, emphasize future career opportunities, and integrate the region into a common voice. Universities are also expanding graduate programs and research chairs to attract recruits. Specific programs are attempting to attract Canadians back to Canada. However, there is a major effort on the part of many geographic regions to use all possible means to attract technology workers. This defines the competitive environment for BC recruiting activities.

8. GENERAL CHARACTERISTICS OF TECHNOLOGY CLUSTERS

The previous chapters have examined recruiting issues through the lens of recruits (chapters 3 thru 6), and the lens of other regional recruiting strategies (chapter 7). It is also important to determine if BC possesses the general characteristics of technology clusters. Although recruits may not directly consider these characteristics, analysis may provide key insight into long-term regional issues. Each of the following sections focuses on cluster characteristics identified in various academic research articles. An evaluation of BC against each characteristic is also provided.

8.1 Regional Technology Clusters Specialize By Product

Cortright and Mayer (2001) provide substantial evidence that most geographic areas with technology clusters tend to specialize. One of the interviewees stated that employees are generally attracted to those regions that have clusters associated with their specific work interest. Clusters signal opportunity, growth, and synergy.

Some additional observations from Cortright and Mayer about high technology geographic areas include:

- high tech employment is focused in a few industry clusters (examples are shown in Table 6)
- majority of patents are granted to only a few firms specializing in one or more related technologies
- Investment funding flows to a few sets of technologies in an geographic area (e.g. venture capital disproportionately goes to the biotech industries in San Diego)

Table 6: Geographic regions specialize by product offerings

Geographic Centre	Specialization
Atlanta	Software databases, Telecommunications
Austin	Semiconductors, Computers and software, Biotechnology/medical
Boston	Computers, Medical Devices, Software, Biotechnology
Denver	Data Storage, Telecommunications
Finland	Telecommunications
Portland	Semiconductors, Display Technology, Wafers
Raleigh-Durham	Computers, Databases, Pharmaceuticals
San Diego	Telecommunications, Biotechnology
Silicon Valley	Semiconductors, Computers, Software, Communication Equipment, SME, EDA, Data Storage
Seattle	Software, Biotechnology, Aerospace
Washington D.C.	Databases, Internet Service, Telecommunications, Biotechnology

Data source: Cortright and Mayer (2001, p. 3), Miller (2002, p. 2), Rosenberg (2002)

Some of the strongest geographic areas have clusters that are linked for synergistic benefits (personal communication with Heike Mayer on 28 Nov 2005). For example, Washington D.C. leveraged strengths in internet services and telecommunications to the mutual advantage of both clusters.

BC has definitive technology clusters (Chapter 2). Furthermore, focused patent activity in biotech (Section 5.3) and cooperation between the clusters (Section 5.4) are similar to other geographic regions. Thus, BC exhibits the specialization characteristic seen in other technology clusters.

8.2 Crucial Factors for Development of a Research-Dependent Cluster

The previous section indicated that specialization is an important characteristic of regional clusters. In some cases there are special needs for enabling cluster development. This is particular true when the cluster has a large research component. Biotechnology is an example of this type of cluster. Walcott (2002) indicates the factors that are needed for a research-dependent cluster. These are:

- outstanding research university with specialties directly applicable to the cluster
- entrepreneurial culture
- leadership that is promoting networks
- financial capital
- physical capital

BC has several strengths, relative to these factors. The strong connection between BC universities and the biotechnology community has been exhibited in patents and start-ups (Section 5.3). This is also a positive indication of the entrepreneurial culture in BC. Networks are also a strength for BC, demonstrated by the industry support of the clusters (Section 5.4). BC also offers a wide range of available real estate, dependent upon the needs of the specific company.

The only BC weakness in the above factors is in financial capital. As noted in Section 5.3, BC receives substantial less venture capital than many other geographic

regions. Furthermore, BC has a specific weakness in capital for later stage financing. This has resulted in many BC companies being sold at the time of putting product to market.

8.3 Role of Government in Technology Cluster Development

The previous section emphasized the role of universities and financial institutions in technology clusters. The support of industry has also been identified as a key element for attracting recruits (Section 5.4). Government also has a critical role in planning for cluster growth (Section 5.5). While recruits typically examine the general technology development plan for a region, the implementation of this plan is an important role for government.

Porter (2000, p. 26) describes the basic items that a government provides in any economy. These include economic and political stability, infrastructure, rules and incentives, and economic development. Porter concludes that these roles are necessary but not sufficient to develop technology clusters. He concludes that a specific role of facilitating cluster development emerges particularly as the government progresses in providing the basic needs.

Four government roles are identified for assisting cluster development (Porter, 2000, p. 28). One role is assisting with the inputs for technology development. This includes education and training, university research, and infrastructure (transportation, communications, etc). Another role is to enable networking through industry forums and attracting companies from other locations. A third role is to help create demand for the cluster's products and services, including the government being one of the buyers. The fourth role is to provide an appropriate context for cluster development. This includes

organizing government department around clusters, attracting foreign investment, and promoting the clusters.

The BC government does well in most of the above areas. Education and training, research, and infrastructure have been identified as strengths for BC. The government often participates in industry forums, and is actively involved in attracting companies and investment by funding organizations such as Leading Edge BC. Additionally, the Premier's Technology Council is advocating exploiting technology from the energy and sustainability clusters to improve the province's environment.

A weakness for BC is the lack of organization around the clusters. Many different government functions must be coordinated to grow clusters (Porter, 2000, p. 29). These include dissemination of economic information, promoting exports, regulatory reform, promoting foreign investment, and developing science and technology policy. Furthermore, it is important for local government to have easily identifiable coordination points for addressing regional issues. This does not exist in the provincial government. As discussed in Section 5.5, the lack of a dedicated position in the provincial government is an impediment to cluster development.

8.4 Summary - Academic Research Reinforces Relocation Perceptions of Recruits

Overall, this chapter summarized some of the relevant academic research in cluster development. BC exhibits many of the strengths that are present in other technology clusters. Furthermore, many of the roles needed by government to support technology clusters is done in BC. However, significant weaknesses exist in venture capital and government organization around technology development. This further emphasizes the weaknesses identified by recruits to BC. These weaknesses not only impede recruiting, but also overall development of the BC clusters.

9. ALTERNATIVES FOR BC RECRUITING STRATEGIES

Chapters 3 thru 6 provided an analysis of BC, from the perspective of an employee making a relocation decision. Chapter 7 discussed other regional strategies. Chapter 8 described characteristics of technology clusters. Figure 14 summarizes the key findings from these chapters. A red rating reflects a major weakness for BC recruiting. A green rating implies the area is generally considered “on par” with other jurisdictions. A yellow rating is an area that has a substantial weakness, and some strength. A blue rating implies a major competitive strength for recruiting.

There are clearly features that are attractive to new workers. These features include exciting work, well managed companies, and lifestyle. However, BC is asking potential employees to trade this off these positive features against lower net income at a higher risk, in a province that does not have a clear plan for its technology clusters.

Figure 14 also suggests that several strategies used by other regions are stronger on features where BC already has significant weaknesses. This may have the potential of widening the gap in BC’s ability to recruit external talent. Actions taken by other Canadian universities also threaten to create a competitive edge for these regions.

Figure 14: BC is asking technology workers to trade off a positive lifestyle, for lower net disposable income within a small technology cluster without a regional plan.

Motivation Factor	Sub-Factor	Rating	Strategies being used by other regions
Job Offer	Net Disposable Income	Red	<ul style="list-style-type: none"> Improved incentives and salaries
	Benefits	Green	
	Exciting Work	Blue	
	Company Management	Blue	
Future Career Opportunities	Regional Employment	Red	<ul style="list-style-type: none"> Technology circles Geographic region branding Attract expats
	R&D Spending	Red	
	Entrepreneurship	Yellow	
	Industry Support	Blue	
	Government technology plan	Red	
	Post-secondary education	Green	
Lifestyle	Living Conditions	Blue	
	Schools	Blue	
	Public Safety	Yellow	
	Tolerance	Blue	

The interviewees identified one additional key issue. This is the lack of an easily accessible source of information on critical recruiting issues. While BC may have much strength in recruiting, demonstrating this to potential employees is often problematic.

9.1 Strategic Recruiting Issues

The following list summarizes the key issues for recruiting external talent to BC.

1. Job offers
 - Low net disposable income, primarily from low salaries and high cost of housing
2. Future career opportunities
 - Small technology worker population evidenced by total employment, low R&D spending relative to GDP, and low relative investment
 - Widening gap in attractiveness of post-secondary education
 - Lack of a regional technology plan
3. Lifestyle
 - High property crime
4. Support to company recruiting efforts
 - Lack of easily accessible information for recruits
 - Recruiting of expats

9.2 Strategic Alternatives

The previous section described the recruiting issues facing BC. Several strategic approaches are available for addressing these issues. These approaches are discussed in the following sections.

9.2.1 Develop new clusters versus building on existing clusters

One possible strategic approach is to develop new clusters, versus building on the existing clusters. Several studies have indicated that building on existing clusters is the right strategy. There are several reasons for the difficulty in building new clusters

(Cortright & Mayer, 2001, p. 8). Technology clusters almost always leverage the knowledge base of current workers and emphasize the inherent geographic strengths of a region. Cortright & Mayer concluded that economic development efforts should build on existing or emerging technical competencies. Furthermore, building a new technology cluster is likely to be lengthy and will probably not yield positive results. Porter (2000, p. 26) also agrees with this approach. Thus, it is not recommended that BC adopt a strategy of developing currently non-existent technology clusters.

9.2.2 Replicate specific strategies used by other regions

Another possible approach is to adopt the specific strategy used by one or more other regions. However, Section 8.1 demonstrated that specialization is a major factor in current technology clusters. This specialization suggests that generic strategies should not be used (Cortright & Mayer, 2001, p. 8). This is because technology is extremely diverse, and prospers because of the often unique combination of a region's knowledge base and geographic characteristics. Cortright & Mayer concluded that there is no universal recipe or strategy for successful technology cluster development. Thus, it is not recommended that the overall strategy from another region be singularly adopted for use by BC.

9.2.3 Continue using only current strategies

Another strategic approach is to continue using the current BC strategies. However, interviewees have expressed difficulty in attracting personnel to BC. Some companies are able to recruit based on world-class dominance and/or size. In most cases, recruits come to BC for some reason other than the job offer. This is because of the desire for the BC lifestyle or some other family issue. BC has been able to meet current technology worker requirements. This is not likely to be sustainable. The CEO

of Pivotal (a local BC technology company) points out that there are many advantages to living in BC. However, he also observed there are other great places to live (Ferry, 2000). Furthermore, there are no cases of technology clusters thriving without active plans for growth and development. This indicates continuing current strategies will not address BC's long-term needs.

9.2.4 Focus exclusively on a single motivational factor

Another approach is to focus available resources on a single issue such as better job offers, attracting more companies to BC, or property crime. However, this approach will not provide attractiveness to a broad range of technology workers. For example, dramatically increasing job offers (either through increased salaries or reduced cost of living) would not overcome current perceptions of relocation risk. Similarly, focus on increased R&D spending or attracting companies does not overcome gaps in comparative job offers. This strategy will attract some workers, but does not seem viable for long-term success.

9.2.5 Develop and implement plans that address each motivational factor

An approach that addresses each motivation factor provides the best opportunity to address recruiting issues in BC. As indicated in Chapter 3, there are huge variations among individual needs and desires when considering a geographic relocation. The interaction of all three motivational factors is significant for influencing the relocation of technology workers. This approach is the strategic alternative selected for addressing BC's recruiting issues.

10. RECOMMENDATIONS TO IMPROVE BC RECRUITING AND RETENTION

The selected strategic approach is to address each of the issues described in Section 8.1. Proposed solutions are discussed in the following sections.

10.1 Improve Job Offers

One of the top impediments for attracting workers is the reduction in net disposable income. BC technology clusters are mainly comprised of small companies. The adverse financial impacts preclude substantial increases in salaries. This may be possible in the future, as the technology clusters grow. However, this is not a viable near term strategy.

BC Biotech recommended that BC adopt tax incentives similar to Ontario and Quebec (Section 7.1). While these programs may be appropriate for some clusters, the incentives will not work for the technology community as a whole. The reduction of taxes on stock options is an extremely difficult political issue. Stock options are mainly associated with mid- and upper management, and the primary benefit would likely go to these personnel. Furthermore, stock options may have a declining value to high technology employees. BC recruiters have seen a trend away from the traditional value of stock options, toward cash based incentives. This is presumably because of the negative impact that the dot.com crash had on stock options. In addition, companies are moving to expense their stock options. The future attractiveness of stock options is uncertain.

Quebec has a tax holiday that provides a five-year personal tax exemption for technology workers. However, this type of concept does not work well for U.S. citizens. The U.S. bases taxes on the country of citizenship. However, because of the tax treaty between the U.S. and Canada, U.S. citizens residing in Canada are given credit on their U.S. income tax for taxes paid in Canada. A tax credit in Canada would still result in taxes paid to the U.S. This greatly reduces the effectiveness of the tax credit in recruiting from the United States.

Cost of housing is the biggest non-salary impact to potential employees. Austin and other cities have used housing assistance as a method of attracting technology workers. This has proved to be successful, in attracting workers and companies. A housing assistance program for recruits to BC is recommended. The form of the housing assistance could take a variety of forms. This could be lower mortgage interest loans, tax reductions for mortgage interest, or a general tax credit.

A general tax credit is recommended as the form of housing assistance. Lower mortgage interest loans would require additional government infrastructure to administer, resulting in higher costs. Tax reductions for mortgage interest introduce a concept inconsistent with the general philosophy and intent of BC tax law. A general tax credit provides a good balance for these issues. The general tax credit does not add additional administrative cost nor create a “new” philosophy around BC tax structure. Housing assistance will increase employee net disposable income, as well as provide a positive message about BC’s commitment to the technology clusters. Additional research is needed to determine the amount of the tax credit.

The proposed housing tax credit provides a strong solution to BC’s low net disposable income. This solution, combined with BC’s exciting work and strong management of companies, results in substantial improvement of BC job offers.

10.2 Enhance Future Career Opportunities

The previous section addressed improvement to the job offers of individual companies. The following sections discuss solutions to issues that impact recruit's evaluation of the technology clusters.

10.2.1 Define BC's long term technology cluster goals

A fundamental premise of the ITI is BC TIA's goal of doubling revenue and employment of BC technology companies by the year 2010. The ITI Board should support a provincial policy that proposes this as a government goal. Figure 15 provides a proposed goal statement.

Figure 15: The proposed BC technology cluster goal emphasizes growth, technology leadership, attractiveness to employees, and quality of life

"BC will double the revenue and employment in BC of our technology clusters by the year 2010. The long term goal is for BC to be recognized internationally as a world class leader in each of our technology clusters, **and the region of employment choice for scientists and engineers**. We will grow by attracting companies to BC, as well as growing our organic businesses. We will do all of this without compromising our commitment to the outstanding quality of life which is distinctively British Columbia".

This definition provides several key messages to potential employees:

- Growth in technology is critically important to BC.
- BC will grow employment inside the province. This does not preclude companies growing out the province

(including outsourcing). However, it does say that growth in the province is important.

- Equal importance is placed on technology leadership and the desire to attract employees to the region.
- This goal transcends political administrations – evaluation of the impact (positive or negative) of future administrations to the goal is quantifiable.
- BC will continue to support the quality of life that has been a key appeal for recruits.

This definition (or one similar to it) provides the basis of a long-term strategy for BC. The ITI board should recommend that all government sponsored technology organizations and relevant government organizations support this goal. This would involve each organization describing their programs in the context of the goal. This would be done as part of annual budget submissions. This would include organizations such as the Premiere's Technology Council, the BC Innovation Council, and Leading Edge BC. Government organizations responsible for immigration, HR, and urban planning will also be included. This will also allow an integrated view by the government across all organizations to ensure consistency of policy and programs. The alignment will also form the basis of a regional technology plan, as organizational budgets and goals are iterated in accordance with the goal.

The alignment of all organizations to the goal will also highlight other potential organizational shortcomings. For example, the lack of a dedicated cabinet-level minister focused on technology will be obvious, as the government identifies which organization will be responsible for overseeing this process. Other gaps and shortfalls will also be identified during this process. It is expected that a major reorganization within the government may be required to support the technology clusters long-term. This alignment process can facilitate the understanding of BC government requirements in this area.

10.2.2 Brand BC for the technology industry

The unifying vision presented in the previous section will also form the basis of a regional branding effort. BC lacks a distinctive brand as a technology location. For example, the home page of the Premier's site does not present a vision of BC, as it relates to technology. This is evidenced by the fact that there is not a picture (as of January 10, 2006) on the home page (<http://www.gov.bc.ca/bvprd/bc/home.do>) that shows any BC's technology.

The closest site to offering a brand is the Leading Edge BC site (www.leadingedgebc.com). It offers a mix of information for potential technology employees, companies and investors. This site provides a brand for BC as a place to live, work, and invest. The industry association websites generally only provide information about their members. They do not provide information about living and working in BC. This is not surprising, given the lack of a unifying brand for the BC technology clusters.

It is recommended that the ITI board advocate a provincial brand for the technology industry. A recommended brand is the BC logo, with the term "the region of choice for the technology industry to live, work, and invest". This has the benefit of creating a "by-line" that can be attached to the province's brand. The overall brand leverages the work that has already been accomplished in branding BC and builds a program around this strength. Advocacy by the ITI board sends the message that industry will utilize the brand as part of industry's positioning activities. The branding strategy would result in a specific set of messages for various audiences. Further, a common "look and feel" for technology cluster materials would result. This is similar in concept to the current cluster handouts developed by Leading Edge BC. Each of these

handouts has a common cover and layout, indirectly emphasizing unity of the BC technology community.

Tag lines and common messages are a benefit of this process. This will also have the benefit of pulling together the activities of industry organizations, foreign affairs departments, and tourism bureaus (Taylor, 2005). The primary goal is to present a unified vision for BC technology to all audiences. It also has the benefit of showing regional cooperation and eliminating the perception of fragmentation. This branding will also facilitate joint job fairs and other industry events.

A key part of the branding will describe BC as the region of choice for scientists and engineers. The analysis in chapters 4 thru 6 of this report provides a starting point for this definition. Emphasis will be give to the exciting work, well-managed companies, long-term growth opportunities, and BC lifestyle. Additionally, as proposed programs are implemented (such as housing credits), these can be incorporated into the branding.

Overall, the branding achieves a goal of “one brand – one message”. This is critically important for the BC region to overcome perceptions of size and fragmentation.

10.2.3 Aggressively pursue the “right” kind of companies for BC

BC’s strategy and brand will emphasize technology growth. This will also include activities to attract companies. However, it is important that the right types of companies be recruited to support technology cluster development in BC.

The presence of a major R&D company in a region does not necessarily provide the elements needed to grow a technology cluster. For example, if a company is primarily doing development, it may not be making significant contributions to the research base. Furthermore, corporate cultures can be very different. Some companies may have a culture of keeping innovations in house – others have a culture

of allowing spinouts to occur. This seems to have occurred in the Portland area. Although Intel has a strong presence, there are relatively few new companies associated with Intel. Tektronix, on the other hand, has a large number of new companies associated with its presence. In fact, Tektronix acted as a surrogate research university (Mayer, 2005), performing many of the same critical functions as a major research university.

There is no evidence to indicate that BC is currently trying to recruit the “wrong” type of companies. However, being clearer on this topic may provide potential technology workers with a strong sense of BC’s commitment to grow the region in support of stated goals. Characteristics of the “right” kind of companies include a high amount of patent activity, generation of substantial intellectual property, and the creation of spin-off companies. Evaluation of these factors will be particularly important if a company requests financial considerations for relocation. This evaluation will encourage a long-term view of the potential impact of a new company to the region.

10.2.4 Increase R&D funding for colleges and universities

The previous section discussed attracting the right types of companies to BC. New companies are a way to bring additional employees into the region. Colleges and universities can also attract people to a region. The ITI Leadership Board should advocate increased R&D funding for colleges and universities. This includes scholarships for Masters and PhD students at BC universities. These scholarships should support students in areas of interest to the technology clusters. Key management skills would also be included such as general management, marketing, sales, and product development. Internship programs for graduate students should also be advocated, as well as increased funding for research chairs. Overall, this provides an additional method (other than job offers) of attracting potential technology workers to BC.

Additional research needs to be conducted on the size and amount of this funding. However, it is clear that the widening gap (particularly between BC and other Canadian universities) needed to be addressed.

10.3 Support “Quality of Life” Programs

The previous sections have examined improvements to the job offers and long-term opportunities in BC. BC also has a strong history of concern for quality of life. The ITI Board should re-emphasize the technology community support of these goals. The technology community would send a clear message about continuing to emphasize BC's quality of life strengths as part of an ongoing agenda. This would also send a message to all work sectors, that the technology clusters are interested in programs that enhance all of British Columbia. Specific advocacy should be given for programs reducing BC's property crime rate.

10.4 Support to Company Recruiting Efforts

The proposed recommendations provide recruits with improved job offers. Additionally, specific recommendations have been made to improve future career opportunities through regional growth. Analysis has also indicated that the lack of easily accessible information is an impediment to effective recruiting. The following section discusses how this should be improved.

10.4.1 Provide a recruiting information web site

One of the key concerns expressed by interviewees is the lack of information easily available to potential recruits. Currently, there is no single internet site for potential recruits to find out critical information about BC.

It recommended that www.techtalentbc.ca be created. The site would be the single portal for BC recruiting information. The web site will be the responsibility of the ITI management board. The HR Tech Group of BC TIA should be responsible for the overall content of the site. This provides the focus of the site as a tool to attract talent to BC. Statistics about the technology clusters should be the responsibility of Leading Edge BC. This ensures consistency with the messages and information provided to investors and outside companies. .

The web site should be organized around the items of concern to potential recruits. Table 7 shows the key areas for the web site. The emphasis should be on providing information that is factually correct and balanced. Positive and negative information should be provided, in order to provide credibility.

Table 7: www.techtalentbc.ca provides recruiting information in one convenient portal

Web Item	Content
<p>Message from the Premier</p>	<ul style="list-style-type: none"> • State the long term vision for the technology cluster and the regional technology plan • Discuss some specific programs to achieve that goal; also discuss BC commitment to quality of life • Discuss what we get for our tax dollars (cleanliness, safety, etc)
<p>Technology Clusters and future career opportunities</p>	<ul style="list-style-type: none"> • General section on the clusters including growth and R&D spending • Discuss entrepreneurship including how companies are started, available resources, success stories – create image of a thriving start-up community • Describe each tech cluster (size, growth plans/strategies, # companies, key accomplishments, and a directory listing). Also provide links to technology association web sites • Have a prominent leader do a video on their technology cluster, especially emphasizing the exciting work in BC. Also have a video with all of the leaders describing the leveraging between the clusters • Have a video by a leading investor that discusses evidence of the management of BC companies • Describe post-secondary education's specific support to the tech clusters (academic programs, internships, etc)
<p>Job Offers</p>	<ul style="list-style-type: none"> • Information on cost of living, cost of housing, taxes, and mandated benefits (statutory holidays, maternity benefits, etc) • Health care information. Basic information, comparisons with other countries. Include information on health statistics such as life expectancy, infant mortality rate, and other key indicators. Directly address issues of media concern such as wait times, availability of doctors, and quality of care. Also have a specific section for Canadian's contemplating moving to the United States (particularly addressing cost of coverage) • Reference videos in the "Technology Clusters" section on exciting work and management of companies

Web Item	Content
Lifestyle	<ul style="list-style-type: none"> • Leverage BC's strengths; compare and contrast to other parts of the world • Show video of BC's geography and lifestyle • Strongly present BC's tolerance and studies on BC as the #1 place to live • Provide transit maps and information.
Job Opportunities	<ul style="list-style-type: none"> • Create a portal for all technology companies to list openings
"Editorial Section"	<ul style="list-style-type: none"> • Refute other jurisdictions commentaries on BC • Article of the month by prominent member of tech community including HR issues • Other topics of interest
Intranet	<ul style="list-style-type: none"> • Provide an internal tool for BC companies to get information on regional compensation, recruiting resources, etc.
Questions & Answers	<ul style="list-style-type: none"> • Provide an email address for questions. Post appropriate answers. Guarantee a 48-hour turnaround. Organize around key areas to create a feel of "ask an expert".

The web site can be developed for minimal cost. BC TIA already has commitments from web design companies. In addition, much of the marketing and statistical information is available from Leading Edge BC. The largest expense is the recommended videos.

10.4.2 Program for recruiting expats is not recommended

The previous discussed significant improvement to the availability of recruiting information. This will address the issue of recruiting expats. A specific program for recruiting expats is not recommended. The success of this approach in other provinces

is unclear. The key issue for expats is the availability of jobs. As BC's branding program is undertaken, the benefits of coming back to BC will clearly be seen. Additionally, as the job market expands in BC, the opportunity for attracting expats will grow.

11. CONCLUSION

Technology workers analyze the job offer, potential opportunities and lifestyle considerations when evaluating a geographic relocation. The recommendations presented in Chapter 10 provide an integrated solution to recruiting technology workers. The proposed housing credit significantly enhances the job offers from BC companies (Section 10.1). The definition of BC's long-term cluster goals (Section 10.2.1.) and the branding of BC (Section 10.2.2) address similar activities by other jurisdictions. Additionally, it provides a unified voice of key messages and imagery. This will make the BC technology community look larger and better integrated. The pursuit of the "right" kind of companies (Section 10.2.3) helps to grow the technology base in a way that will also drive research and innovation. Scholarships for masters and PhD students (Section 10.2.4) provide another method of attracting technology workers to BC. Technology cluster support to government quality of life programs (Section 10.3) reinforces one of the key strengths that is unique to BC. A recruiting web site (Section 10.4.1) will provide critical information needed by technology workers to make informed relocation decisions. All of the above activities will make BC more attractive to expats (Section 10.4.2) and improve long-term retention.

APPENDIX: INTERVIEW LIST

Name	Organization	Position
Allison Rutherford	HR Tech Group	Executive Director
Betsy Gibbons	Korn/Ferry International	Executive Recruiter
Bob Murray	People First Solutions	Partner
Bodil Geyer	Inteqna	Practice Leader
Bruce Schmidt	Genome BC	Corporate Secretary
Caroline Jellinck	Ray & Berndtson	Partner
Casey Forrest	Pinton, Forrest & Madden	Partner
Chris Curtis	Fuel Cells Canada	Vice President
Cindy Pearson	BC TIA	Vice President
Clive Holloway	Holloway Schultz & Partners	Partner
Diane Gardiner	Anormed	Director, Human Resources
Don Avison	University Presidents' Council	President
Dorothy Keenan	Futureworks	Partner
Hakan Telenius	BC Innovation Council	Director of Business Development
Heike Meyer	Virginia Tech University	Assistant Professor
Iona Fisher	MacDonald Dettwiler	Project Manager, Formerly Director of HR
Jared Shaw	Inteqna	Account Manager
Julian Taylor	Power Tech Alliance	Executive Director
Karimah Es Sabar	BC Biotech	Executive Director
Kelli Vukelic	Korn/Ferry International	Executive Recruiter
Kimberlay Brooks	Corporate Recruiters	Manager, Technology Division
Lynda Brown	New Media BC	President
Michael Hansen	Veridian Corporation	Formerly Senior VP of Organizational Capability
Mike Bringuel	eBay	Senior Director, Human Resources Global Customer Support , Legal & HR
Rob Cruickshank	BC TIA	President
Robert Grace	Leading Edge BC	VP Economics & Research
Sang Mah	Wireless Innovation Society	President
Steve Mair	Electronic Arts Canada	Recruiting Operations Manager
Steve Reimer	Inteqna	Account Manager
Wai Young	Self	Consultant

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