TOWARDS A LEARNING CENTRED VIEW
OF
INTELLECTUAL CAPITAL

The value of learning and knowledge in the human resource strategies of
innovative small and medium-sized computer service firms in British Columbia

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ABSTRACT

This study examines the value placed on learning and knowledge by innovative small and medium-sized computer service firms, using a framework for analysis adapted from intellectual capital (IC). Knowledge is conceived as a specialized and appreciable asset capable of being acquired, nurtured, developed, managed and commercially exploited.

Emphasis is placed on evaluating the strategies and practices that drive company learning and knowledge transfer in smaller computer service companies with respect to developing and making use of the knowledge owned by employees, customers and the corporation. The study evaluates the extent to which short-term commercial objectives impose conceptual boundaries on particular forms of intellectual capital – skill development, experience and recurrent learning. Data is drawn from case studies and a broader, provincial sample of companies based in British Columbia with ten to one hundred employees.

The study concludes that small and medium-sized computer service firms narrowly conceptualize and undervalue knowledge in the area of human resource development, where supporting learning processes and structures are often poorly developed. Companies place a premium value on new forms of knowledge with an obvious potential
to improve the skills and experience necessary to support commercial products and services. In contrast, learning, knowledge and expertise related to professional development and more long-term organizational and/or career benefits are consistently and systematically marginalized.

The study outlines limitations of the IC framework in terms of the intrinsic values attributed to sources and types of knowledge. Of particular concern is the importance attached to formalized, external relationships with customers and the undervaluing of knowledge with less obvious or potentially more long-term commercial value.

Suggestions for using the framework in small and medium-sized computer firms include broadening the existing narrow focus of external knowledge sources to encompass the extensive network of business relationships companies exploit, while the undervaluing of knowledge found in professional development is countered by linking benefits to returns from specific, rather than generic commercial goals. Emphasis is placed on potential gains in efficiency and productivity offered by improvements to learning and organizational processes.
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CHAPTER I - INTRODUCTION

1.1 BACKGROUND TO STUDY

Addressing the workforce needs of high tech sectors has become a significant feature of educational policy in British Columbia. Government, industry and business groups continue to promote the social and economic benefits of moving the province away from a resource based economy, while economic policies focus on meeting the demand for specialized knowledge and skills in emerging fields and markets, rather than subsidizing conditions of over supply in the declining resource sectors of forestry, mining and fishing (MAETT, 1991, 1998; MSTL, 1995).

However, the majority of firms working in these high tech areas are also classified as small and medium-sized enterprises, which in B.C. equates to firms with less than 60 employees, or more commonly, under ten (B.C. Stats, 1997; TIA, 1997). Given the dynamic, often entrepreneurial and limited managerial resources present in smaller high tech companies, providing policy makers with comprehensive data on how firms manage their workforce - human resources development (HRD) - has proven problematic, particularly with regard to the process of learning and knowledge acquisition.

Of the three major studies looking into the relationship between learning, knowledge and human resource needs of small and medium-sized companies, only Schuetze et al (1997) focuses exclusively on B.C, with the computer services sector comprising one of a four sector study into innovation, skills and learning in small and medium-sized enterprises.
Work by Baldwin (1994) and Betcherman (1997) has focussed on developing national characteristics, trends and corporate returns on education and training.

Although firm and sector profiles of knowledge and learning contexts remain underdeveloped, given the pivotal role of education in gaining access to the workplace, institutions of higher education are under increasing pressure to respond to the changing nature of employment and specialized needs of particular sectors and occupational areas (Fisher, et al. 1994; BCBC, 1997; MEST, 1996).

At the firm level, computer service companies have responded to shortages of suitably qualified workers and high turnover rates by phasing out extensive orientation and training programmes for new and inexperienced employees. Firms now routinely screen applicants for computer literacy, while expecting a conversance with, and experience of, workplace protocols. Increase emphasis is placed on firm suitability with equal importance attributed to self-sufficiency and interpersonal skills (BCCC, 1997; Schuetze et al, 1997).

Provincial trends indicate that continued employment will involve the periodic upgrading of qualifications and skills, along with the ability to incorporate these new workplace characteristics into career planning (MAETT, 1991; MEST, 1997). This has resulted in the emergence of a broader mandate for education, embodied in life-long learning strategies. Institutions are reaching out to business, resulting in an increase in work-based and co-op programmes, full fee business seminars and MBA degrees, along with an
expanded role for continuing education in the areas of high tech skills and management training

Less apparent is evidence of a well developed corporate response to high tech skill shortages by the computer services sector – in response to what many consider a global, rather than provincial shortage of highly skilled technical, marketing and mid-management professionals. Of particular concern to both policy makers and the business community is the disproportional low incidence of mature, successful computer service companies to emerge from an rapidly expanding small and medium-sized high tech sector, and the extent to which shortages of skilled and experienced professionals are contributing factors (SCBC, 1995; SPC, 1997). These are the companies most affected by increased competition for skills, yet the most elusive in terms of participating in policy advisory groups, with a clear disaffection for public sector training initiatives (Schuetze, et al, 1997).

Computer service companies and high tech industry associations attribute the ‘inconsistently predictable’ responses of managers to limited resources, rapidly developing technology and intense competition (Maloney, 1997; SPC, 1997; TIA, 1997). In contrast, professional associations offer a contrasting perspective, indicating concerns over a situation where market demand for high tech skills has effectively promoted and rewarded short-lived technical expertise, inexperience and lack of professional development (Slofstra, 1996). Studies highlight the failure of managers to recognize
economic returns, ignorance and the consequences associated with a professional culture comprised of 'free spirits' with little or no learning culture (MAETT, 1998; Loo, 1991).

This suggests a lack of consensus and cohesion in responding to skill shortages and professional certification programmes, evidenced by low membership rates in organizations such as the Canadian Information Processing Society (CIPS). It also demonstrates an intrinsic difference in two contrasting yet interrelated perspectives on the role and benefits of 'in-demand' technical skills and experience, versus long-term professional development (Best, 1997). The absence of an apparent need or incentive to co-operate in raising levels of professional competence has served to inhibit the broad acceptance of formalized learning strategies in high tech sectors such as computer services (Schuetze et al, 1997).

Business and industry associations have actively promoted the perception that companies would respond favourably to initiatives intended to assist in the development of necessary skill and expertise (MAETT, 1998). However, given the often poor response rates and absence of supporting data\(^1\), more research needs to undertaken in order to validate the size of constituencies represented, the competence and/or extent to which managers are prepared and subsequently respond and whether public sector involvement in the learning and skill development of knowledge based companies might act as an disincentive to developing in-house learning infrastructures. The latter is poignant with respect to both

\(^1\) MAETT (1998) computer industry report - 17% survey response rate - Innovation, Skill and Learning
this sector and study. Previous studies into innovation, learning and training suggest incentive appears to have joined expedience, in playing a significant role in how small and medium-sized computer service firms respond to human resource development in terms of the value attributed to knowledge and supporting learning infrastructures (Baldwin, et al., 1995; Betcherman, 1997; Schuetze, 1997). The challenge for workforce strategists appears one of how to merge the incentive associated with commercial gains with the expedience of making the most efficient and effective use of limited resources, which in small high tech firms centres on competent management of the knowledge and learning driving products, services and organizational structures.

1.2 OVERVIEW OF STUDY

This study examines the advantages to both firms and educational service providers of marrying commercial goals, learning processes and operational necessity into a practical and sector specific human resource strategy and eventual management tool for smaller, innovative computer service firms. One with the capacity to increase individual and firm competency by complementing and enhancing, rather than containing the dynamic and entrepreneurial qualities of this sector.

Education serves as the disciplinary perspective, centred in learning and the acquisition of knowledge and skills, while the focus is one of leverage and the extent to which companies are making efficient and competent use of the principal resource driving the products, services and processes of high tech companies: the knowledge of their
employees. This interest finds expression in the field of intellectual capital (IC), which serves as the study’s conceptual lens, whereby commercial benefits are thought to accrue from an inclusive and interacting system of returns, with the capacity to incorporate both individual and external components of knowledge. Here the knowledge owned by employees, customers and the firm is perceived as an appreciable and exploitable commercial asset.

The conceptual strength of IC centres on the potential to incorporate facets of efficiency, competence and strategic management with regard to using knowledge and learning to improve the overall and long-term skill levels, expertise and professional acumen, related not only to technical and managerial functions but also sales and marketing. IC also provides sufficient disciplinary flexibility to incorporate the development of a process and learning centred approach with the type of categories, characteristics and operational conditions necessary for measurement.

Explored is the contention that - by recognizing, nurturing and capturing knowledge it can be managed and leveraged to improve products and procedures, and in doing so, is transforms knowledge into what Ulrich (1998) believes is effectively the firm’s only appreciable asset: collective knowledge that encompasses an organizations culture, systems and processes.

This study further extends the applied focus of knowledge implicit to the IC perspective to include gains in efficiency and productivity. Management claims of feeling
overwhelmed by financial and organizational limitation are now discussed in relation to both the short and long term benefits associated with making better use of existing resources, exploring the impact of having excess capacity with respect to releasing senior employees to engage in mentoring and supervisory functions. Questions centre on the subsequent impact this might have on developing in-house solutions to the type of skill shortages likely to inhibit the generation of new knowledge necessary to drive products, services and processes.

1.3 OBJECTIVES

The objective of this study is to determine whether the human resource strategies\(^2\) of innovative, small and medium sized computer service firms in British Columbia realize the commercial potential implicit in organizational learning and knowledge.

The intent is to employ the intellectual capital perspective as the basis for analysis, while assessing limitations of the existing taxonomy with respect to the context of innovative small and medium-sized computer service firms - comparing the results of this approach to those of previous studies. Explored is the relationship between strategies and practices supporting the acquisition, nurturing, management and exploitation of employee and customer knowledge, and the conceptual boundaries firms impose on the value of particular forms of skills, experience and recurrent learning.

\(^2\) Human resource strategies and development (HRD). These terms are used in an educational context to include learning processes that facilitate the acquisition, creation, nurturing and development of knowledge.
Specific study objectives include:

- Determining the extent to which employers acquire, nurture, develop and exploit the knowledge and experience of existing employees and business associates to improve organizational strategies, structures, practices, and productivity levels;

- Evaluating the intellectual capital framework in terms of the concepts, ease of use, appropriateness to small and medium-sized companies and high tech sectors, and possible modifications that would be useful to companies interested in developing this concept into a formalized human resource tool.

1.4 RESEARCH QUESTIONS

The central question of the study is:

*Do innovative, small and medium-sized computer service firms conceptualize particular forms of knowledge and recurrent learning in terms of their value to products and services or organizational processes?*

Within this broadly conceptualized focus there are three secondary or framing questions:

1. What type of business context do computer service firms operate within and does this impact why and how do firms respond to their human resource development;

2. What policies, strategies and practices have established small and medium sized enterprises adopted in order to acquire, recognize, nurture, develop, capture, and exploit the knowledge owned by employees, customers and their own organizational structures;

3. Do smaller firms use mentoring and supervision as a means of improving efficiency, productivity and human resource development.
1.5 SIGNIFICANCE OF THE STUDY

The study is significant in respect to three areas: the contribution the analytical framework makes to the field of intellectual capital; the use and application of leverage as an approach to learning, knowledge and human resources development within areas of public policy, institutions and professional associations; and the focus on size and sector - small and medium-sized computer services firms in British Columbia.

The framework for analysis provides firms, policy makers, industry associations and those involved in training and broader based educational programmes with a perspective of learning and knowledge within innovative small and medium-sized computer firms that makes a case for more effective and creative use of the knowledge firms have at their immediate disposal. This is timely, in that smaller, established firms in this sector are showing increased interest in industry and size specific approaches to issues such as technical and mid-management skill shortages and making more efficient use of resources - issues which significantly impact the ability to attract funding and capital.

Limitations of the framework are discussed in the concluding chapter and may provide insights useful in subsequent research and studies. This discussion also makes suggestions for using the framework in smaller high tech firms, which is a departure from the majority of IC dialogue, which tends to focus on larger corporations.
In terms of data, analysis and overall conclusions, the study findings have implications for firms, industry associations, professional groups, private sector trainers and public institutions. Analysis will be useful to companies interested in making comparisons of their knowledge management strategies against established companies with a demonstrated track record of innovative approaches to business situations. Findings will also serve as a checklist for case study firms as they continue their corporate ‘visioning’ process. The study also provides a working introduction to the type of factors that can be employed to develop a profile of how to use learning and knowledge strategically.

By way of contrast, industry associations, professional agencies and both private sector trainers and public institutions may find a role for the discussion framework in marketing the concept of lifelong learning within a more structured and business orientated framework, which offers organizations tangible returns on investment without institutions relinquishing broader educational goals embodied in the learning and skill components of knowledge acquisition, management and exploitation.

And finally, the area of curriculum development. The IC framework makes a clear distinction between the types of technical, professional and business knowledge found within organizations and how these components interrelate, while providing a structure for approaching, differentiating, determining and contextualizing the specialized knowledge needs of companies against existing programme goals and objectives.
1.6 STRUCTURE OF THE STUDY

The initial part of the study reviews literature on the operational, innovative, knowledge and learning, and strategic management contexts of small and medium-sized computer firms in British Columbia. This chapter serves three functions. The first provides a context for the subsequent discussion of why and how learning and knowledge are viewed, valued and managed in smaller high tech firms, with specific reference to:

- prevailing theories and perspectives on the business and innovative context firms operate within;
- types and forms of learning and knowledge found in smaller firms; and finally,
- strategies for managing learning and knowledge.

The second function seeks to establish firm characteristics of learning and knowledge already resent in the literature and useful for evaluating the effectiveness of the framework, while the third centres on developing the broader, and strategic management potential of the IC perspective, prior to introducing the formal taxonomy and analytical framework - used to structure both data and the conclusions of the study.

Following a review of literature the conceptual lens and framework are presented in chapter three, where intellectual capital is examined in detail, reviewing human, customer and structural capital with respect to characteristics, contrasting perspectives and assessment criteria present in the literature. The study’s framework for analysis is also formalized, presented with accompanying verification of why and how the final form
was arrived at. Factors cited include the need for a generic framework and suitability for use in smaller firms.

The study's methodology is outlined in chapter four. The origin, objectives and research protocols used to compile the secondary database are examined, coupled with an explanation of procedures and limitations. The latter reviews issues such as size of sample, age of database and bias.

Findings of the study are presented in chapter five. Data relate to business/operational contexts and the three components of IC - human, customer and structural capital, encompassing:

- firm and sector characteristics, growth patterns and perceived challenges
- hiring practices, training and professional development and the management of knowledge;
- forums used in the creation, access and transfer of knowledge, innovation, learning and knowledge transfer and support services; and
- organizational, innovation and process capital

Outlined are the policies, strategies and practices adopted by firms with regard to the developing trust and commitment in the areas of human, customer and structural capital. The subsequent discussion of findings (chapter six) examines this developing profile of why, how and in what ways learning and knowledge are perceived, structured and delivered in smaller computer service firms with regard to the influence of short versus long-term business objectives on the value assigned to each.
The concluding chapter seeks to address questions in two areas. First, the extent to which innovative, small and medium-sized computer firms narrowly conceive the value of particular forms of knowledge, skills experience and recurrent learning, - the influence and impact of short-term commercial goals on the decision making process, and the implications this has for human resource development strategies. Secondly, the usefulness of the IC conceptual and analytical framework for developing a learning and knowledge perspective of smaller high tech or computer services firms.

Implications for policy and further research complete the study. Policy will be discussed with regard to both public and private sector interests, while further research will focus on further development of the IC perspective - stressing the need for a size and sector specific models. Suggestion for through additional studies identify present limitations with regard to data collection and applied focus.
CHAPTER II - REVIEW OF LITERATURE

2.1 INTRODUCTION

The review of literature encompasses areas of research related to innovation and learning, learning and knowledge, and the management of knowledge in dynamic, small and medium-sized business organizations. While the focuses of the study is small and medium-sized computer service firms in British Columbia, limited research and the often sectoral focus of literature has resulted in a broader high tech context for sections of the review. Emphasis is placed on reviewing the influences thought to be driving the policies, structures and approaches to managing the skills, attributes, experience and overall knowledge base of these organizations.

Developed are the often complementary relationships that exists between economic or market driven perspectives of the role and form of organizational learning and those suggested by cognitive and institutional theorists. The review concludes with a recognition of the present trend towards the strategic management and leverage of intellectual resources embodied in the intellectual capital perspective, which forms both the conceptual and analytical framework for the study.

2.2 INNOVATION: THEORETICAL PERSPECTIVES

Innovation is defined as "the search for, and the discovery, development, improvement, adoption and commercialization of new processes, .. products and, ... organizational
structures and procedures” (Jorde and Teece, 1990:76). The process can also be viewed as “creating new knowledge and drawing on the knowledge pool to generate new products and processes” (Hall, 1986:1).

There are a number of theories offering explanations of the process and structures of innovation. These range from traditional economic perspectives present in serial and simultaneous models, to the more commercial and strategic approaches of flexible specialization and regulation theory, the life-cycle focus of techno-economic paradigms and the more inclusive view of the innovation process as a system. The significance to both this study and knowledge management can be found in the strategies and trajectory innovation is thought to follow, and by extension, the type of knowledge networks one might expect to develop.

2.2.1 Serial and Simultaneous Models

The serial model views innovation as a sequential process, taking place in a “linear and predictable fashion, from research to development, design, production, and then finally to marketing, sales and service” (Jorde and Teece, 1990: 77). Feedback loops or overlaps between stages are absent. In contrast, simultaneous models “recognize the existence of tight linkages between firms, within firms and sometimes between firms and other organizations like universities” (ibid:77). The significance of the simultaneous model lies in the view of innovation as incremental, cumulative and not dependent on research as a
starting point or initiator. Innovation is viewed as a process that builds on existing knowledge.

Product Life Cycle Theory

Product life cycle theory offers a broader perspective of the development or innovation sequence. In its simplest form the life cycles of products are portrayed as linear, with “one development pattern for all products” (Flynn, 1987: 10). Innovation is viewed as a three stage development, comprise of research, development – application and marketing overlap (Abernathy, Clark and Kantrow; 1983), with four corresponding sales growth characteristics – introduction, rapid, diminished and stability or decline (Flynn, 1987). The initial stages of development are typically considered volatile. Firms face operating conditions where high rates of innovation and market uncertainty frequently overlap and applications serve to focus market interest. The type of knowledge needed at this stage of the project is usually highly specialized. A common feature is the flurry of similar products on the market as competitors also assess and work with the new technology (Abernathy, Clark and Kantrow; 1983).

Innovation is then thought to move from a development to application mode as firms attempt to recoup their R&D investment. Studies indicate the focus of innovation then shifts to marketing, although in smaller enterprises, options may be limited due to fiscal and organizational constraints - resulting in incremental innovation as the organizational practices ‘on-the-job-training’, slowly building a critical mass of specialized skills and
expertise, and increasing the value of employees working in these areas - which by extension results in forms becoming more vulnerable to employee turnover (Baldwin et al., 1995; Betcherman, 1997).

Slow rates of change are also reminiscent of the Kaizen management philosophy, whereby innovation is perceived in terms of small but continuous improvements involving all facets of the organization and extended relationships (Martin, 1995). Coombs (1988) suggests this gradual building of skill and expertise consolidates the position of larger high tech firms by virtue of having both the experience and market power to support their position. However, companies in British Columbia appear more interested in using strategic partnerships to protect their autonomy and development research interests (TIA, 1997), suggesting that size can also work to consolidate sectors against larger competitors.

2.2.2 Flexible Specialization

Flexible specialization views innovation in terms of an incremental process born of the proximity, reciprocity and trust between firms with similar technical interests dividing their resources into distinct areas of specialization and cooperating networks. Learning is considered a central element in the subsequent networks of self-interest that emerge, perceived as the exchange of information within and among firms, which in turn leads to the expansion of innovative capacity. Piore (1992) considers the process of innovation in terms of creating tension between competing interests, with new products emerging
because of pressure to produce, in which firms continuously adapt to marketplace
demands.

This theory is generally associated with the type of large scale cooperation and markets
found in Europe, eastern Canada and the US. However, government interest in attracting
the type of large scale relocation or creation of ‘clean’ high tech firms may result in a
renewed interest and relevance in provinces such as British Columbia and Alberta. This
strategy offers potential gains to small computer service firms in the form of
opportunities to share R&D costs, training facilities and technical data, while providing
valuable networks of experience for the sector as a whole.

The inherent liability of flexible specialization is one of becoming too specialized and
dependent on partnerships, to the exclusion of other commercial opportunities and areas
of technology. There have been attempts to determine the “optimal mix of innovation
projects” (Hall, 1986:7). Nelson and Winter (1982) determined that firms are motivated
by the prospect of large gains rather than a rational response to often limited resources.
As such, unprotected technology is likely to attract others looking to take advantage of
the same opportunity. While this may result in the transfer of knowledge between
competing firms, results suggest the rewards of being first to market are often alluring
enough to result in firms overextending their resources.

Flexible specialization theory relies on learning and related benefits being closely tied to
labour force mobility and a “reshuffling …of skills, know-how and experience acquired
at (their) previous job(s)" (Saxenian, 1989: 37). It is assumed firms have the structures in place to capture the knowledge of key employees before they are 're-cycled' and that workers will remain in the immediate area - placing a strategic value on competence and learning with regard to the capacity of management to respond to changing conditions.

2.2.3 Regulation Theory

In contrast, regulation theory explores the subcontracting aspect of strategic partnerships, which tend to be narrowly conceived in terms of sector and type of work. This type of business strategy is closely associated with the growing pressures on larger corporations to streamline (Coriat, 1992), whereby creative and structurally expensive R&D areas are contracted out to more cost effective and flexible small companies (Harrison and Kluver, 1989).

Studies suggest that the advantage for small computer service firms of this type of strategic relationship typically lies in the funding of projects and access to related technology through the client. Liabilities include investment in personnel and no legal right to the technology developed (Schuetze, et al. 1997). Maintaining this type of arrangement often results in differing patterns of innovation and learning than one would expect to find in truly independent companies. Client needs tend to drive decision making, with greater emphasis on the process and goals of improved efficiency and productivity. The value or incentive associated with learning and knowledge are tied directly to returns from funded work (Baldwin, 1995).
Regulation theory also provides a broader perspective from which to view existing public sector involvement in high tech skill shortages. There is the potential for investments in educational infrastructure to inadvertently form the basis for buy-outs, in that while a well trained and educated workforce may result in a greater percentage of smaller high tech companies growing into larger corporations, well run and profitable companies also make attractive acquisitions. However, perhaps more appropriate to both B.C. and the computer service firms specifically, is the school of thought that views flexibility and specialized development more beneficial than size and proximity (Taylor, 1986). This is especially relevant in a sector where the majority of SMEs operate within fast moving niche markets.

2.2.4 Techno-Economic Paradigms

In contrast to regional or broad innovation theories, techno-economic paradigms focus on technology life-cycles. Perspectives attempt to reconcile what technology areas produce, with why and how organizations move through a particular product cycle - highlighting the rise of small specialized firms operating in niche markets (Freeman and Perez, 1988; Perez, 1988). Here products and the processes driving them are viewed as interrelated aspects of innovation systems that include technical, organizational and management related functions, rather than independent and exclusive outcomes.

One of the major advantages of a sector specific model is the opportunity to explore what products look like in terms of their development pattern, while gaining a deeper
understanding of what constitutes ‘new’ R&D versus an extension or application of an existing technology: both may be innovative uses, yet reflect differentiated phases of a product life cycle. This perspective also provides a useful background for this study in that it presents a strategic case for establishing knowledge management systems, relating innovative success to determining the skills and infrastructures necessary to support new products and processes. While analysts typically examine the relevance of product life-cycle theory in relation to new technology (Taylor, 1986), placing development sequences within an innovative context also affords the opportunity to introduce the dynamic and uncertain nature of high tech environments against which knowledge management takes place. In this instance, determining the life cycle stage of a firm’s product range provides insight into the decisions being made with regard to the strategic use of resources.

2.2.5 Systems of Innovation

The complex nature of innovation has lead to interest in developing a broader and more inclusive model of influences and networks, many of which appear drawn from the simultaneous model and centre on the role and nature of linkages and feedback. Lundvall (1995) suggests companies operate, whether consciously or not, within systems of innovations, which are defined in terms of interacting influences and relationships - specifically, the creation, dissemination and exploitation of new and commercially useful knowledge. Influences and relationships that Edquist, et al. (1997) considers part of sophisticated ‘system’ of feedback mechanisms and relationships, comprised of
Influences on firms in these systems include: size; history/ownership; management; government support; access to markets; and capital sources (Voyer, 1994, Baldwin, et al., 1994) - with markets and finance also cited by industry and business associations as obstacles to growth (BCCC, 1994; TIA, 1997). However, there are also institutional factors shaping firm and system responses, present in the regulations, professional standards and management practices owners and managers have to comply with (Edquist, et al., 1997).

Significant to this study are the often intangible factors of learning, knowledge management and human resource development, which effectively includes knowledge acquisition, training and professional development, and the learning processes that support these activities (Lundvall, 1995).

2.2.6 Organizational Change

Broad models and theories suggest underlying influences and operational characteristics of both regions and systems of innovation. However, the role and significance of technology becomes most evident at the firm level, where rapid rates of change, coupled with the decreasing shelf-life of many products serve to create both organizational tension (Bouwen and Fry, 1988; Wolfe, 1990a) and the impetus for developing new
perspectives and approaches – and by extension work structures, learning processes and knowledge structures of the firms in this study

In order to remain competitive, companies routinely re-evaluate business strategies and company structures, practices, products and services - against the capacity to innovate - “the object (of which) may be diversification through product, market or technological….it may be a process of managerial innovation, which often follows economic, technological, or cultural-political changes” (Hosking and Anderson, 1992:124). Studies indicate organizational change is often a reflection of company history, years in operation, education levels, management style and philosophy, access to financial resources, market forces and regulatory environment (Freeman and Barley, 1990; Schuetze et al., 1997).

Forms of organizational change reflect the actions companies take to respond to innovation. Examples of theories and corresponding strategies include: developing an interactive and learning centred work environment – where flat or organic hierarchies, decentralized decision making and groups work characteristics are common - learning organizations; building and sustaining a core of skilled employees, while contracting service and lower skill needs on an ‘if and when needed’ basis – where more structured hierarchies and compartmentalized work units are common - core-periphery model; and environments where technical (equipment, procedures etc) and social systems (interpersonal relationships, interaction ) are assigned equal and essential elements of an effective work organization – and characterized by the development of autonomous work
groups, responsible for project schedules, staffing and conditions – STS\textsuperscript{3} socio-technical theory (Hosking and Anderson, 1992; Newton, 1996; Bushe and Shani, 1991).

2.3 LEARNING, INNOVATION AND KNOWLEDGE - SMEs

2.3.1 Introduction

The relationship between innovation, learning, knowledge management and commercial success is central to this study. Within this context, economy based literature typically defines learning in terms of a process, whereby the capture, flow, use and dissemination of information, experience and skills are related to:

- doing (Arrow, 1962); using (Rosenberg, 1982);
- interacting (Lundvall, 1988); and
- knowing (Nonaka and Takeuchi, 1995)

Learning is seldom viewed as conforming to one particular form or process. Significant is the cumulative nature of these learning contexts, which serves to link this perspective with the previously outlined simultaneous model of innovation.

The two primary contexts of learning are individual and organizational (Pedler, et al., 1988). Relevant to the high tech focus of this study is the perspective of Attewell (1992),

\textsuperscript{3} Socio-technical theory (STS) or socio-technical systems theory (STST)
who, in a discourse on technology diffusion, contends that “implementing a complex new technology requires both individual and organizational learning”. Specifically:

“individual learning involves the distillation of an individual’s experiences regarding a technology into understandings that may be viewed as personal skills and knowledge. Organizational learning is built out of this individual learning of members of an organization, but is distinctive...(while)...the organization learns only insofar as individual insights and skills become embodied in organizational routines, practices and beliefs that outlast the presence of the originating individual ” (p.6)

2.3.2 Theoretical Perspectives

Theories often identified as significant to innovation and SMEs propose learning as: a structured process and investment, where skills and knowledge are dependent on situation and context – situated learning or situated cognition (Resnick, 1987a/b; Stern, 1992); a process examining, questioning, validating and revising personal experiences – transformative and action learning (Mezirow, 1990; Argyris,1982; Argyris and Schon, 1974); and, a characterization of a broader organizational learning culture, where the motivation, processes and context of learning are stressed – learning organization (Senge, 1990; Lundvall, 1995).

Interest in situated learning reflects a shift in focus from “how knowledge gets recorded ...how knowledge is constructed and....the context in which learning - instruction take place...questioning...traditional positions like the one that skill and knowledge is independent of context” (Rubenson and Schuetze, 1995). Rather than trying to alter
learning behaviour, there is greater emphasis on understanding the social and cultural context and adaptation in which cognitive skills develop (Sternberg, 1985) and providing a meaningful context or way of presenting material. The ability to relate to what is being presented is considered central to promoting a sense of trust and emancipation - a comfort zone, where learners develop a sense of control over their learning (Resnick, 1989).

Transformative learning introduces critical and reflective components (Mezirow, 1991), to skill and knowledge acquisition, with strong links to the metacognitive school, centred in executive processing functions - planning, monitoring and evaluating intellectual task performance (Sincoff and Sternberg, 1989). These critical components are also present in the work of Argyris (1994) and Volpert (1989) - theory in action, where taking time to analyze, reflect and learn 'before' acting is related to work conditions, with goals of efficiency, autonomy and control. Emphasis is placed on providing working conditions conducive to personal growth, which both employee and company have the potential to benefit from.

The transformative process views learning as an extension of an on-going “ability to make assumptions explicit” - positions which serve to provide both context and a sense of validation, and ultimately, action (Cranton, 1994:24). While situated and transformation theories centre on context and self-directed qualities of individual and organizational learning, the development of a broader and more inclusive and learning ‘culture’ lies at the centre of learning companies (Senge, 1990; Lundvall, 1995), although there is no definitive model (Dale, 1994; Hommen, 1995). Drew and Smith (1998)
suggest a model where the learning organization is a "metaphor, rather than a distinct type of structure", reflecting "a social system whose members have learned conscious communal processes for continually:

- generating, retaining and leveraging individual and collective learning to improve performance of organizational system in ways important to all stakeholders; and
- monitoring and improving performance" (p.2)

In contrast, Pedler (1988) suggests a definition whereby learning is encouraged amongst all employees and used to continuously transform itself. Individual learning and potential is harnessed by the company, which in turn expands this learning culture to include external stakeholders. Commitment is further consolidated by linking HRD to business policy and goals. Influences on innovation originate with the transformation process, centred in "the search for new ideas, ... problems and ... opportunities for learning, from which competitive advantage can be culled." (Rowley, 1998).

2.3.3 Innovation and Organizational Learning - SMEs

Literature on organizational learning and innovation examines the 'characteristics and influences' on the learning cultures of both employees and companies - organizational learning is comprised of shared patterns and understandings. Interpretations of these patterns of learning include the contingency and institutional approaches embodied in absorptive capacity and institutional isomorphism (DiMaggio and Powell, 1983).
Under this perspective, organizations are believed to learn from other organizations in their field or sector (horizontal networks and relationships) or from groups or individuals within the company (vertical power relationships and organizational structures). The inclusion of these perspectives is considered useful in that studies, looking into the policies, structures, and practices surrounding learning and knowledge in smaller high-tech firms, have identified factors such as owner/management, culture/values, external influences, previous knowledge and experience as essential elements in establishing the increased levels of trust and commitment deemed necessary for the creation of new knowledge and innovation (Voyer, 1994; Harris, 1996; Betcherman, 1997; Schuetze, et al., 1997; Ruggles, 1998)

The significance of absorptive capacity is the focus on a firm's ability to exploit external sources of knowledge, using the prior knowledge of employees and managers as a learning context or building frame (Weick, 1991). Given the presence of an existing knowledge base, learning is typically incremental in nature, growing slowly over time. In terms of how knowledge is transferred, literature points to two conduits: specialized gatekeepers, whereby knowledge is filtered and disseminated according to interest and need; and a more organic and broad exposure to incoming knowledge, whereby organizational structures are relaxed in favour of a broad team or project-based approach to moving intellectual material in and around the company (Cohen and Levinthal, 1990).
This is also the nurturing environment for communities of practice, comprised of interest groups who effectively filter and disseminated information - on either a formal or informal basis (Lundvall, 1995; Amidon, 1997). Studies suggests firms who filter material experience fewer problems codifying information, yet may underestimate the significance of other more generic material. In contrast, organic organizations run the risk of information overload, with few procedures or structures in place to capture and document potentially significant material (Lyles and Schwenk, 1992).

Case studies on smaller high tech companies underscore the importance of both structured and informal opportunities to transfer knowledge, while pointing to the increasing role of communities of practice as 'defacto' gatekeepers within organizations. Here employees with common interests eg., 'Java and the internet' in the computer service sector would monitor, filter and report on aspects of the technology considered pertinent or offering potential to the innovative capacity of the company (Schuetze, et al., 1997; Amidon, 1997).

Absorptive capacity is thought to be characteristic of, and most effective in, flexible organizations with employees from a broad range of disciplinary backgrounds, whereby there is a greater range of skills, expertise and intellectual material to stimulate innovation. Business environment is thought to play a significant role in how learning and knowledge are perceived, with the fast pace and contingency based high tech firms considered representative of this type of learning in action (Cohen and Levinthal, 1990; Hommen, 1995).
In contrast, institutional isomorphism views external influences on learning from a broader context. Rather than viewing firm responses to external influences as purely economic or market driven, the context is moved to an inherently political arena, seeking to clarify the form and extent of the power relationships between employees, owner/managers and external influences with respect to how each is viewed and responded to (Dimaggio and Powell, 1983).

In regard to learning, literature indicates that external relationships or networking play a significant role in the innovation process, while smaller companies often rely upon these relationships to supplement their in-house knowledge base. The focus is one of determining the extent to which previous experience has shaped decision making processes and the impact these successes and failures have on the capacity to remain open to new ideas, whether product, service or process related (Hommen, 1995; Davenport and Prusak 1998; Powell, 1998).

Studies suggest that the greater the involvement with external networks and their institutions the more pressure is exerted to conform to common standards, which is often rationalized in terms of the need to create a common language or means of communicating and transferring knowledge (BCCC, 1997; Schuetze, et al., 1997; TIA. 1997) The potential impact of these external relationships or influences on firms is explored within three contrasting modes of change: coercive, mimetic and normative isomorphism (Dimaggio and Powell, 1983).
Coercive isomorphism is centred in the influence of organizations or institutional agencies and the pressure exerted on firms to conform to certain guidelines or regulations. This is often tied to issues of industry legitimacy and the development of a broadening power base. Presently, this type of regulatory conformity is often met with considerable disdain and avoidance by high tech firms, where the practice is viewed in terms of creating extra paperwork and an distinct market advantage to competitors with little or no regulation (Dimaggio and Powell, 1983; Schuetze et al., 1997; TIA, 1997.

In contrast, mimetic isomorphism is considered to be a self-imposed restriction or conformity, closely associated with a need to find direction and structure. Companies are thought to seek out best practice models to improve both efficiency and corporate image and is the basis for structured methodologies, such as ISO, which can be problematic in that organizations may adopt an approach inappropriate to their needs (Dimaggio and Powell, 1983; Cyert and March, 1963; Brooking, 1999). Mimetic isomorphism has interest for this study given recent attempts to shape the direction of the computer services sector in B.C., where companies are being encouraged and show signs of adopting structured methodologies used extensively by US counterparts (MAETT, 1998).

The final vehicle of change is normative isomorphism, which differs from the preceding two forms of conformity with respect to a focus on professional rather than sectoral and/or commercial goals. This is essentially people with the same occupation defining professional standards, conditions and direction of practice (Dimaggio and Powell, 1983). The significance attached to normative isomorphism lies in the potential for one
professional perspective, understood procedures and practices to unduly influence the
type of skills and learning backgrounds entering and driving company policies on training
and career development, over those of other professional areas and interests (Cohn, 1985)
Recent work in B.C.'s computer service sector provides evidence of this tension between
engineering and computing areas, as two distinct professional areas increasingly encroach
upon the same development areas (Schuetze et al, 1997).

2.4 KNOWLEDGE

The knowledge base of a firm has the potential to enhance opportunities for growth and
economic success. Nonaka (1994) relates the potential of knowledge to the "interaction
of environment and means" in creating and distributing knowledge and information (ibid: 14).

2.4.1 Definitions – Knowledge and information

Knowledge and information are central tenants of studies into learning and knowledge
management and often perceived as interchangeable concepts. Yet information and
knowledge signify contrasting perspectives. The distinction is often related to action
(Gruber, 1989), whereby "information is the flow of messages, while knowledge is the
created and organized by the very flow of information, anchored on the commitment and
beliefs of its holder" (Nonaka, 1994:15).
However, Davenport and Prusak (1998) hypothesize - knowledge and information are
only two facets of a broader knowledge context that incorporates ‘data’. If information
is the flow of messages, “data is a set of discrete, objective facts about events” (p.2).
Further differentiation’s and significant to both innovation and the management of
learning and knowledge are:

• strategic knowledge – which guides actions and serves as incentive to develop
tool/means of acquiring more (Gruber, 1989) and is strongly tied to cognitive
perspectives of ‘belief and commitment’; and.
• information – syntactic and semantic perspectives (Bateson, 1979) whereby
information is simply measured and stored (syntactic) or “contains new
meaning” semantic - insight gained from perception (Nonaka, 1994: 16).

The semantic perception is considered to be the most useful when reviewing learning
contexts, whereby a firm’s perception, and subsequent approach to the knowledge of
‘collective memories’ (Schumman and Scott, 1989) may have a direct impact on hiring,
with regard to extending resources on the orientation, supervision and mentoring of new
employees in the why, when, and how an organization functions (Huber, 1991).

2.4.2 Categories of Knowledge

There are two categories of knowledge useful in discussing knowledge management:
core and peripheral. Core knowledge relates to organizational mission, values, culture,
operation and products, while peripheral knowledge is centred in the performance of
specific tasks and not widely shared (Lyles and Schwenk, 1992). Each category plays a
distinct role in generating and bringing form to ideas, and by extension, facilitating understanding of the various perspectives operating within an organization.

Core and Peripheral Knowledge

The creation, use and expansion of core and peripheral knowledge reflect the degree of consensus, competency and dissemination organizations reach with regard to the comparative roles and functions of a firm's operation (Hommen, 1995).

Firm mission, business objectives and culture are considered elements of core knowledge, and what organizational theory suggest amounts to a widely shared and agreed upon understanding of company goals, procedures and values (Lyles and Schwenk, 1992). By contrast, peripheral knowledge is more specific, relating to meeting the objectives, expectations and tasks associated with everyday work, typically expressed in high tech SMEs, within the dynamics of rapidly changing individual, team or project situations. This is knowledge not easily shared unless well integrated into organizational learning structures – weekly progress meetings, presentations, email.

Given both of these definitions are loosely based on an organizational knowledge perspective, there is a need to view these terms as enabling on one hand, yet also restrictive, in the sense that one needs to be viewed in relation to the other, which effectively places structural parameters on analytical frameworks looking into how core and peripheral knowledge interact.
2.4.3 Creation, Conversion and Transfer of Knowledge

The creation and transfer of knowledge is related to the process whereby "the combination of information, context, and experiences... used by a person and placed in that person's frame of reference... is transformed into knowledge" (Harris, 1996:3).

In the area of knowledge management, tacit and explicit knowledge are frequently cited as essential elements in a company's intellectual potential, in that the interaction of 'knowing that' (explicit) and 'knowing how' (tacit) forge a link between what someone can put expression to, and the information, skills and experience that continually and collectively act as a backdrop for cognitive processes (Nonaka and Takeuchi, 1995).

Knowledge is considered "deeply rooted in action (tacit) or codified in formal, systematic language" (Nonaka, 1994: 16)

Within the context of innovation, this process is viewed as a dialogue between tacit and explicit knowledge, incorporating four forms of knowledge conversion (Nonaka, 1994)

1. socialization;
2. externalization;
3. internalization; and
4. combination.

In the first of these, people expand their tacit understanding through shared experience (socialization), while in the second instance tacit knowledge is converted into an explicit form by sharing personal or group experiences and developing a formal record (externalization). In the third form of conversion explicit knowledge become tacit when
formal documents, drawings and oral stories are exchanges but the subsequent shared memories remain with the person rather than documented (internalization). While in the fourth and final category, explicit knowledge is converted or reconfigured into new forms of itself that result in new applications (combination).

The creation or generation of knowledge is often referred to in terms of “by-product of several types of interaction” (Brooking, 1999:93), with the most common of which are:

- acquisition (hiring)
- on-the-job learning – experience gained from work – by doing
- training and education
- mentoring
- brainstorming
- social interaction
- meetings

(Leonard, 1995; Brooking, 1999, 1997; Davenport and Prusak, 1998)

The majority of knowledge creating and transfer opportunities are also viewed as conduits or venues for the flow of knowledge or transfer within an organization. Studies suggest the most common opportunities for knowledge creation arise from:

- formal / informal networks – social activities/casual meetings
- scheduled workshops
- brown bag lunch sessions
- project/team meetings

(Schuetze, et al., 1997; Brooking, 1999).
2.4.4 Levels of Knowledge

Levels of knowledge refers to the function knowledge performs. Using the taxonomy suggested by Wigg (1993) and subsequently developed by Brooking (1999), there are four categories deemed useful to companies and their employees:

- goal setting or idealistic;
- systematic;
- pragmatic; and
- automatic.

Goal setting knowledge relates to ‘what’s possible’ (ibid:54). At the firm level this type of knowledge is associated, expected and recognized at the senior levels of management. This is where the goals, vision and values of a company are determined or filter down from. Brooking maintains that the ability to vision and set goals should not be confused with the ability to translate this knowledge from a tacit to explicit form and the management processes necessary to achieve success.

In contrast, systematic knowledge is centred in reasoning and analysis. Here the emphasis is on strategies for solving problems and includes knowledge of professional methodologies to assist companies realize their commercial goals. Systematic knowledge often moves from a tacit state to an explicit form as companies codify and develop organizational procedures and strategies for business proposals, training, documentation and protocols.
Pragmatic knowledge is typically "explicit, well known and understood" (ibid:58). In a work context (pragmatic knowledge) would extend to represent fundamental acceptable behaviours. This is sometime referred to in terms of common sense and related to reconciling action and context. In contrast, automatic knowledge is the most tacit of the four levels of knowledge and refers to familiar or job related knowledge, that the "user...just does... without necessary considering exactly why or how they are doing a particular task " (ibid:59). Given the often tacit nature of routine jobs automatic knowledge is seldom codified.

2.4.5 Skills and Knowledge - Core Capabilities

There are three types of skills and knowledge discussed in the literature, which consensus suggests move from general to more specific capabilities. Focus appears to dictate the final classification term used. Leonard (1995) discussing capabilities in terms of public (scientific), industry and firm specific skills and knowledge, while Stewart (1997) adopts an economic perspective, whereby both are reasoned to represent a commodity, leverage or proprietary role within a company.

Under the sector classification offered by Leonard (1995), public or scientific skills/knowledge are broad and deep enough in nature to preclude specific ownership, while other types are considered to have the type of applied or industry specific characteristic attractive to specialized areas of activity. Firm specific skills and knowledge are considered commercially useful to a particular organization, "not so easily
duplicated" (ibid:22) and typically related to aspects of product development, organizational protocols and procedures.

In contrast, Stewart’s classification (1997) looks to the value of skills and knowledge as corporate assets, asserting that “the challenge......, is to find and enhance those talents that are truly assets – for not all skills are created equal (ibid:89). Here generic skills and knowledge are valued as commodities, “readily obtained, and more or less equally valuable to a number of businesses” (ibid:89), while leverage skills are referred to as “knowledge that, while not specific to a particular company, is more valuable to it than to others “(ibid:89). Examples of this would be the recognition of a programmers potential by a software consultancy over that of an organization looking to staff software support positions. Proprietary skills relate to the type of expertise and experience used to develop products, services and ultimately the reputation of a business as a leader in a given field.

2.4.6 Competency and Attributes

Literature on competency and attributes is relevant to this study in that it addresses the ability of individuals and management to act on knowledge. This ability is thought to closely related to learning and influences of resources, workplace culture and organization. (Sundberg, Snowdon and Reynolds, 1978).
Hommen (1995) suggests it would be more appropriate to talk about an individual's potential to act in relation to a specific task, situation or context, framing competency in terms of:

- theoretical knowledge (cognitive - knowing that/what)
- intellectual ability (advanced skills - knowing how);
- psychometric factors (perceptual and manual abilities);
- social ability (e.g., ability to communicate, work co-operatively, leadership);
- attitudes (e.g., loyalty, motivation, acceptance of certain values);
- personal characteristics (e.g., creativity, risk taking, tolerance of uncertainty.

(Hommen. 1995:144)

In contrast, Quinn, et al., (1997) suggests a complementary perspective, which differs in respect to the motivation behind the knowing, caring and perception attributed to knowledge creation and transfer. Quinn’s classification retains the cognitive and advanced skills present in ‘knowing that’ and ‘how to act’, while the reminder adopt the form of:

- system understanding (know why)
- motivated creativity - discovery or invention (care why)
- Synthesis and trained intuition (perceive how and why)

(Quinn, et al., 1997)

System understanding relates to the “interrelationship and pacing rates of influence among variables”, while motivated creativity focuses on “the capacity to interrelate two
or more disciplines to create totally new effects”. Synthesis and trained intuition refer to the ability “to understand or predict relationships that are not measurable” (ibid.:3).

At the sector and firm level these perspectives have formed the basis for studies looking into the types of proficiencies and attributes companies are looking for in their employees (Debling and Behrman 1996; DeLima, 1998; SPC, 1997). With respect to this study and the computer services sector, is the growing significance studies indicate firms are attaching to attributes such as leadership, a sense of work ethics, the ability to plan and meet deadlines, co-operative working, communicative skills and ‘the caring’ and ‘perception of why’ aspects of competency (Raizen, 1991; Betcherman, 1997; Schuetze, 1997; BCBC, 1997).

2.4.7 Context: Innovation and Knowledge Based SMEs

In relation to knowledge based sectors, Harrington and Dalmia (1991), suggest that workers are the creators of intangible, yet value-added assets, while Kiernan (1995) asserts firms need to find ways of tapping into tacit knowledge banks. Both Johnson, (1992) and Nonaka and Takeuchi (1995) suggest these complementary objectives can be accomplished through various forms of interaction and conversion processes, whereby employees are encouraged to observe, articulate, share and write down hitherto more implicit elements of their knowledge.

These perspectives correspond to work on effective forms of organizations and work structures, particularly flat and relaxed hierarchies and those who consider their corporate
approach to be inherently 'organic' and forming the basis of learning organizations and communities of practice (Brown and Duguid, 1989). However, what is surprisingly absent from the literature on knowledge transformation and accessing 'know-how' is industry sponsored research, particularly in British Columbia's high tech areas, where maturing companies are now experiencing shortages of seasoned mid-level managers and marketing specialists, with little success in attracting candidates from outside the province (TIA, 1997; MAET, 1998).

2.5 TRAINING : THE SME CONTEXT

Training has been defined as creating "the human skills that taken together are the repository in which the tacit knowledge of an organization reside" (Baldwin, et al., 1995). These skills are typically comprised of a variety of purposes, but include technology-related skills. These include an intimate understanding of specific technical processes in manufacturing or software and computer-related skills in service industries. The second is to learn how to embed knowledge on products so as to provide new services to clients (ibid:6).

There is a suggested relationship between training, the creation of new knowledge and innovation in "the hypothesis...that the adoption of a wide variety of innovation strategies....fosters a need for training" (Baldwin, et al., 1995:2). Supporting theories and related studies tend to fall within one of two perspectives: either neoclassical and human capital theory based; or that of the institutionalist and situated learning approach (Attewell, 1990; Resnick, 1987a).
2.5.1 Categories of Training

When thinking about broad categories of training found in firms, there are two distinct areas: skill development; and/or the broader context of career preparation - professional development - the latter of which is centred on the development of management related knowledge and skills.

In the area of skill development, literature suggests firms increasingly associate the value of training against expenditures and returns. Quinn, et al., (1997) makes the case that firms frequently focus “virtually all their attention on basic (rather than advanced skill development) and little or none on systems, motivational, creative or perceptive capabilities” (ibid:4), maintaining that the former yields the lowest return on investment, resulting in “mediocrity and loss of profits” (ibid:4). This is nowhere more apparent than at the SME level, where the association between training and rates of return on investment have been examined (Baldwin, et al., 1995). Innovative, high tech service companies are shown to be narrowly focused on specialized technical skills with the potential to realize immediate returns to products and services (Schuetze, et al., 1997), with lower than average expenditures per employee (Betcherman et al., 1997).

The position of management training in SMEs is equally tenuous, with Newton (1995) viewing the situation in terms of limited corporate capabilities. Looking further into studies, it becomes evident that while smaller high tech firms are aware of their inadequacies, and cite improvement as integral to successful innovation (MAETT, 1998),
few actually invest the resources necessary to bring about changes, or link professional
development to organizational philosophy (Schuetze, et al., 1997). Skills identified as essential to professional development include:

- everyday requirements related to operational functions of finance, administration and liaison;
- strategic decision making surrounding marketing, organizational innovation and process, the management of technology (both hardware and software); and,
- the skills and attributes central to developing a sense of direction, leadership style and creativity

(1995)

The contention that “management development is simply not an integral part of doing business in Canada” (Newton, 1994:134) is well supported in the literature (Loo, 1991; Betcherman, 1997; MAETT, 1998). This also corresponds with a broader perspective of linkages between professional development and the role, responsibilities and value of adequately trained management in regard to the innovative capacity of firms - an advocacy that would not be necessary if a training culture existed (Leonard 1995; Amidon, 1997; Brooking, 1999)

2.5.2 Approaches

Evidence of a firm’s commitment to training is present in the strategies or approaches adopted by management. Literature and studies points to three basic approaches to
training in small and medium-sized enterprises: the clear presence of a learning culture, where training is on-going (Pedler et al, 1988; Betcherman et al., 1997); those who recognize the value of training but are primarily event driven; and situations where neither management and employees perceive a need to formally train, yet the extent of informal or incidental learning suggests training is taking place (Betcherman, 1997; Schuetze et al., 1997).

2.5.3 Training, Innovation and SMEs

Studies on small and medium-sized companies, studies provide evidence of an often complementary and integrated relationship between neoclassical and institutionalist interests (Betcherman, 1997; Schuetze et al., 1997). While the decision to train is typically perceived in terms of human capital theory and the knowledge and skills necessary for improving business performance - products and services, situated or contextual learning is inherently social in nature, and represents 'how' companies choose to view and respond to their technical and broader organizational skills and knowledge needs. Within dynamic and innovative sectors, such as computer services, the motivation and drivers of training are thought to include “R&D and technology, quality and human resource strategies” (Baldwin et al., 1995:3).

This broadening of perspectives and approaches is reflected in other training studies, whereby the emphasis has altered from one of developing profiles of those being trained, to what Betcherman (1997) considers are second generation issues of identifying and
categorizing the decision making processes and organizational structures that support human resource development (Baldwin et al., 1995). Similarly, the role and importance of formal training has been reassessed with regard to appropriateness outside of large scale organizations, which may impose limitations with regard to reconciling contrasting approaches with the form and delivery of training - and the varying degrees of accuracy with causality (Baldwin, 1994; Newton, 1995).

This interest is in direct response to the growing economic importance of smaller companies and more specifically, the perceived importance of high tech companies to both the national and provincial economies, where training is placed within broader “Strategies For Success” (Baldwin, 1994; MAETT, 1998). Here, the repository of knowledge, skills and acumen present in established SMEs are viewed in terms of leverage, useful in the mentoring of even smaller and more prolific industry counterparts in the management of growth and success. The need for detailed firm profiles of innovation, learning and knowledge processes has resulted in an increase use of case studies, with both national (Voyer, 1994; Betcherman et al., 1997) and provincial studies of high tech companies undertaken (Schuetze et al., 1997).

2.6 THE STRATEGIC MANAGEMENT OF KNOWLEDGE

The motivation for managing knowledge is summed up by Cole (1998) and the contention that “as the recognition of the importance of knowledge grows, so has the recognition that it needs to treated more explicitly and systematically: it needs to be made
more visible and tangible to be amenable to management.” (ibid:2). Managing resources is a central tenant of the study and later discussion of intellectual capital – the study’s conceptual framework, and defined earlier in the introduction. Within this context knowledge management can be viewed as “an approach to adding or creating value by more actively leveraging the know-how, experience, and judgement resident in, and in many cases, outside of an organization” (Ruggles, 1998:3).

In accepting that knowledge can be managed, information, skills and experience are assumed to possess an intrinsic, and strategic value. At the firm level, determining this value would centre on: the outcome of a knowledge needs assessment; finding people with the required specialized knowledge; accessing what these employees know; determining how they know it, devising ways of retaining and sharing what others know; and ultimately, how this knowledge might be used to improve products, services and revenues (Davenport and Prusak, 1998; Martin, 1995; Amidon, 1997; Brooking, 1997).

The trend towards “recognizing the role of knowledge as primary driver” is discussed further by Miles et al., (1998) who collectively question:

whether the managerial approaches based on mindsets rooted in past practice are appropriate for, or capable of, fully realizing the potential value of knowledge within the firm and/or industry (ibid:7).
In reviewing practices and trends it is noted that the obstacles to fully utilizing knowledge include:

"conceptualizing and measurement of knowledge capital as a primary organizational asset; the integration of knowledge capital into strategic management processes; and the development of organizational forms and processes that facilitate the use and development of knowledge (ibid:7).

In the dynamic and rapidly changing fields of knowledge found in high tech areas, firm size and limited resources significantly impact organizational decision making processes. Consequently, function, location, form, growth and the dissemination of knowledge are viewed as major viability factors (Kiernan, 1995; Schuetze et al., 1997), although, with the exception of the latter, much of the research remains in the arena of large corporations and/or improving skill development, rather than sector specific.

However, there is contrasting perspective on managing knowledge in smaller high tech companies and relevant to issues raised in the introduction to the study — 'the appropriateness of strategies' (Cole, 1998). The fast pace of technological change, coupled with fierce competition between entrepreneurial firms may suggest approaches to managing intellectual material that make sense for larger corporations, yet have a tendency to either stifle the creative energy and/or leave the firm exposed to piracy (Voyer, 1994). Cole (1998) goes further, speculating it is sometimes in a firm's best interest to keep knowledge tacit - linking competitive advantage to the time it would take competitors to replicate knowledge assets. All of which suggests an element of caution
with regard to the over management of resources. Future research directions for knowledge management are outlined by Teece (1998) as:

- quantification of intangible assets
- understand generic inputs versus idiosyncratic inputs and profitability
- entrepreneurial versus administrative capabilities
- competitive advantage of replicated knowledge

Absent is the need for sector and size specific models identified by researchers working in the field of high tech and SMEs (Newton, 1994).

2.6.1 Strategic Perspectives

There are two complementary perspectives on the organization and management of knowledge that have relevance for the focus of this study – knowledge centric information technology environments (Harris, 1996) and the leveraging of knowledge or intellectual capital (Brooking, 1996; Edvinsson and Malone, 1997; Stewart, 1997; Bontis, 1998; Roos, 1997).

Harris (1996) contends that information technology companies are ‘problem’ rather than ‘knowledge based’, while the intellectual capital perspective (Edvinsson and Malone, 1997) views knowledge as the creative force behind innovation and by extension, the driving force behind commercial success for firms involved in the type of the dynamic, fast paced and rapidly changing areas of technology typical of smaller computer service firms. Both perspectives outline principles, structures and practices, although the
knowledge centric approach can be considered a synthesis of existing cognitive based learning approaches, while intellectual capital is an emerging area of interdisciplinary study seeking to integrate contrasting viewpoints.

Knowledge Centric Information Technology Environments

Harris (1996) suggests that technology organizations are not utilizing the tools of their profession - namely, application software. Proposed is the use of intranets, or internal networks, systems and web software as prerequisites for establishing organizational infrastructure. The role of values, context and experience are interwoven into a case of knowledge creating knowledge, with the success of any transferal system resting on the creation of a common understanding of purpose and goals. Lacking is the presence of social caring and trust, identified by Krogh (1998) as integral to the management of knowledge. Sharing forms the basis for success under this approach to managing knowledge, with benefits and gains viewed as incremental, which suggests a link to absorptive capacity. The means of sharing is centred in the support structure, which is conceived in terms of organizational, process and technology components. Specifically, “the organizational component includes the implementation of adjustments to management philosophy, group member interaction, and individual responsibilities the process component includes changes to problem solving ..... decision making ..... and communication processes. The technology component requires the implementation of the technology that will become the knowledge base of the repository as well as any other required support technology.” (Harris, 1996: 6).
These components also correspond to Brooking's (1999) suggestions for a knowledge infrastructure where approach is divided into desired characteristics, management process and growth. Aspired to characteristics include: cultural sensitivity; longevity; evaluation procedures; recognition of memory as a corporate asset; rewarding the sharing of knowledge; and a formally stated corporate mission. In contrast, management processes relate to specific operational elements such as job reviews and salary, training, mentoring and overall HR planning. The final component advocated by Brooking relates to supporting initiatives and systems which include:

- networking and verbal sharing;
- know-how bases;
- groupware knowledge sharing;
- decision support systems;
- expert and knowledge based systems;
- intelligent infrastructure;

(Brooking, 1999:135)

Benefits of the knowledge centric approach are of interest to this study in that Harris relates improvement to: efficiency and productivity in the areas of providing better solutions to problems; more effective decision making; improved support for outsourcers, contractors and professional development with regard to skills development and building expertise.
The concept of intellectual capital (IC) perceives knowledge as an appreciable and exploitable asset, that can be both invested in, and offers returns on. Interest in this area lies in the need to develop approaches to knowledge acquisition and related learning processes to commercial goals.

While this concept is still evolving, the taxonomy draws from traditional human capital theory (Becker, 1975; Schultz, 1963; Mincer, 1989) whereby, "people spend on themselves in diverse ways, not for the sake of present enjoyments, but for the sake of future pecuniary a non pecuniary returns" (Blaug, 1992: 829). The motivation is perceived as one of self-interest and "carried out by individuals" (ibid: 830) although later developed to include broader based institutions present in education systems, with social as well as private rates of returns identified.

Proponents of I.C. have expanded the notion of individual returns to include 'the collective' represented in this instance by 'the firm'. Commercial success rests on the ability of companies to exploit the knowledge owned by employees, customers and their own organization (Edvinsson and Malone, 1997; Dearlove, 1998). Interest in the intellectual capital perspective comes from a diverse number of fields, although human resource management, education, training, economics and accounting are at the forefront of development work - the latter in response to the increasing pressure on knowledge
based sectors and companies to find tangible ways of measuring the resource that drives both the potential and success of their respective enterprises - knowledge.

Of importance are the strategic roles and interaction of three major sources of firm knowledge: employee knowledge - human capital; the knowledge of customers and clients - customer capital; and, knowledge a firm has captured - structural capital (Bontis, 1998; Stewart, 1997). Both objective and subjective elements are incorporated into the analysis of employee knowledge, while providing for separate but equally important categories relating to the capture of knowledge, external sources and influences significant in the area of networking, whether associated with absorptive capacity and the ability to exploit external knowledge (Cohen and Levinthal, 1990), or learning-by-interacting (Lundvall, 1988).

There are two distinct viewpoints evident in the literature, whereby knowledge is assumed to be either a product (capital) or process (drivers). In the former, economists operate from what Slow and Honeyman (1998) perceive to be a need to “understand and value knowledge capital” (p.91), a position that hinges on intangible elements of a company’s business operations being open to measurement and valuation.

*Knowledge as a product*

In terms of this study, there are three factors relating to the economic perspective that require evaluation: namely, the size and sector of the operations being used to formulate
approaches; whether a distinction is being made between formal and informal training; and the assumption that a firm's market value is something that can be empirically tested.

Slow (1999) defines intellectual capital as "the difference between a firm's market value and the net value of its physical assets" (p:91). The process is then divided further, "separating intellectual capital into the value of training - human capital and the ability of a firm to make money from such training" - structural capital (ibid:91). However, while attempts to integrate intangible assets "in (a) less mechanical way than just standard productivity terms" (Slow and Honeyman, 1998:91) appear conducive to a more cognitive approach to capital assessment, findings are centred in a large European company with extensive resources, networking structures, markets and educational pool to draw from, not typically found in British Columbia's computer services sector. It is also raises the issue of incorporating subjective elements without an understanding of the underlying processes at work, something Ulrich (1998) maintains can only be addressed by broadening the parameters of study to include, rather than sideline these components.

Knowledge as a process

By way of contrast, educators and human resource professionals focus primarily on the processes of acquiring, nurturing and developing knowledge. Here, a critical awareness of the skills, learning and experience that comprise 'the intangibles' aspects of knowledge capital are of greater interest and relevance. With such vastly divergent perspectives, there is a corresponding lack of consensus with regard to measuring the
results of knowledge management, an essential element in gaining broad acceptance and practice. Recent work is adopting a more multidimensional and interdisciplinary perspective, whereby context drives the discussion. This effectively provides for economists and educators to inject complimentary enablers relating to either capital or process for the purposes of accommodating their respective paradigms.

*Integrating product and process capital*

Thus, while conventional human capital theory appears somewhat inconsistent with a process driven perspective of learning and knowledge (Hommen, 1995), the evolving intellectual capital framework does provide for the inclusion of factors such as business context and trust, which provide both context and structure to discussions and analytical work, whereby innovation and human resource development are viewed in terms of learning situations and organizational development, yet still retain the more objective elements essential to measuring efficiency and productivity.

In relation to an organizational knowledge and skills perspective, by linking organizational strategies to culturally entrenched knowledge structures, intellectual capital endorses the former, in contending that large bodies of knowledge respond more favourably to a hierarchically structure, comprise of smaller cognitive units (Anderson, 1983). This effectively moves the taxonomy away from the type of easily quantified routine approach advocated by organizational skill theorists, and more reminiscent of the ‘statistical lens’ often associated with human capital theory. In high tech firms faced with
limited resources, inexperienced and inadequately trained managers and high turnover, the temptation to standardize functions and routines is an understandable one, although individual knowledge and skills stand to become outdated or institutionalized (Nordhaug, 1994) - an outcome inconsistent with an essentially innovative sector, dependent on adaptability.

2.6.2 The High Tech Context - SMEs

One question that hasn’t been dealt with by studies up to this point is the extent to which developers and providers of software services subsequently devote in-house resources to their own “institutional devices” (Hommen, 1995) or business systems: which includes knowledge management. Cole (1998) suggests that new information technologies tend to focus on moving information between employees rather than embedding it in organizational routines. There is work on particular firms (Voyer, 1994; Schuetze et al., 1997; Davenport and Prusak, 1997), yet case study approaches remain the exception rather than the norm. The majority of studies relate to sectors and large enterprises or international corporations. Data on the knowledge ‘intrasystems’ or in-house knowledge structures of SMEs remaining sketchy and undeveloped.

In knowledge based sectors, and particularly high tech companies, research suggests firms typically lack a structured understanding of what they do, with even less grasp of the type of information that needs to be captured, where and how material might be accessed, or by whom (Schuetze et al., 1997). In relating types of organizational
approach to learning and knowledge, 'gatekeeping' and 'organic models', take on a new perspective when viewed against what Ulrich (1998) views as a 'competence and commitment' to all three facets of intellectual capital. Data from the Innovation, Skill and Learning Study (Schuetze et al., 1997) indicate the majority of smaller computer service firms, show little interest in adopting a “rational model” of set procedures and object centred, formally structured methodologies for gathering, analyzing and acting upon relevant information (Allison, 1971). This can perhaps be explained by relating organizational approaches to learning against operating structures, which, in the majority of the smaller computer service companies, are relaxed or flat organizational structures more conducive with an organic model (Betcherman, 1997, Schuetze et al., 1997), where limited resources and rapidly changing technical conditions make every employee a “potential receptor” (Burns and Stalker, 1961) and overnight expert.

The pace of change or what Duncan (1972) refers to as “turbulent” environments, is worth exploring in high tech companies because of the real danger that managers may perceive their innovative work environment as less accessible, predictable and ultimately, manageable. This lack of empowerment has the potential to significantly impact learning and knowledge management in terms of the competence and commitment to developing knowledge - contextualized by Hommen, (1995) and Resnick (1989) in terms of perception and willingness, coupled with the ability to use strategies and knowledge to construct new knowledge. A framework that formally differentiates between employees, management related structures and external influences provides discussion points for
evaluating the effectiveness of existing knowledge and learning strategies, and by extension access and the development of approaches for external stakeholders.

2.6.3 Towards a Strategic Framework for Managing Knowledge in SMEs

Much of the research into the capture, dissemination and exploitation of knowledge in smaller firms centres on the strategic role of human resource development and the effectiveness of associated organizational, skill and learning strategies, structures and practices firms have in place (Baldwin, 1994; Newton, 1995; Debling and Behrman, 1996; Schuetze, et al., 1997).

What is less apparent from literature is the development of a broad discussion framework, capable of bridging the often contrasting mandates of stakeholder groups with regard to their role, responsibilities and strategies for coping with the educational and employment needs of a knowledge based economy, and more specifically, firms and sectors involved in ‘cutting edge technology’.

Within this context, it is quite common to have vastly contrasting perspectives, ranging from university co-op programmes with objectives rooted in a close liaison between higher education and industry (U.Vic., 1998), to academics convinced their role is centred in developing a more reflectively individual, with skills and abilities that transcend occupation (Maslen and Slattery, 1994). In contrast, high tech associations typically reduce the education to work paradigm to issues surrounding existing industry
skill shortages, with goals of influencing curriculum and increasing the supply of work ready technical graduates, while professional associations focus on broader and more long-term business and management outcomes (TIA, 1997). Attempts at building a discussion framework for innovative SMEs is a primary objective of a subsequent study into knowledge and human resource development in SMEs (Schuetze et al., 1997), which explores linkages between operational influences and the learning processes and structures supporting the business goals of innovative companies. The significance of this study lies in the attempt to link commercial goals to the potential implicit within organizational structures, educational processes and goals.

2.7 SUMMARY

The review of literature is primarily focussed on how companies view the role of knowledge within the context of innovation and organizational learning. The first section looks specifically at innovation, reviewing the varying theoretical perspectives found in cognitive, institutional, techno-economic and system fields of research, while providing insights into the operational context of small and medium-sized high tech firms. Literature suggests the need for an interdisciplinary lens more appropriate to the dynamic and scaled down operations found in smaller high tech firms and sectors, although the cognitive school of thought appears to dominate work on the benefits of a systematic approach to knowledge management found later in the review.
In the section on learning and knowledge, differing types, forms, creation and transfer are outlined with emphasis on how and why firms respond. Here the work of Nonaka (1994) is contrasted to others working in the field, providing a useful juxtaposition of process and form. In the areas of levels of knowledge, core capabilities, competency and attributes, the literature provides for a clear distinctions between the varying facets of knowledge, along with evidence of the growing importance and trend towards quantifying less tangible facets, such as trust and commitment.

The area of knowledge management completes the review. Research appears focussed on strategic management, relating knowledge to products and services and providing increasing evidence of the consequences of excluding professional development as a distinct commercial goal. The importance of trust is emerging as a central factor in managing knowledge, particularly with regard to encouraging employees and customers to share their skills, expertise and understanding.

The use of technology in creating knowledge infrastructures is also a major topic within the literature, with the majority of papers and texts devoting space to strategies and implementation of methodologies. However the majority of work is either theoretical or taken from large corporations and represent an evolution rather than a distinct methodology. Few authors provide case studies and feedback on future research. While the literature indicates support for a structured approach to knowledge management, there is a note of caution present with regard to the over management of resources. Overall, the focus is on retaining product sensitive specialized knowledge
(Cole, 1998). This is significant in the area of smaller high tech companies where studies indicate an awareness of technical vulnerability with regard to emerging technology and applications (Schuetze, et al, 1997).

The conceptual framework for the study is introduced in this chapter and concludes the review. Intellectual capital is presented as a related yet evolved and distinct juncture to conventional human capital theory (HCT) - an interdisciplinary field, comprised of literature from economics, education and sociology, in addition to professional areas such as accounting and management and human resources development. While HCT is centred in individual and institutional returns on education, IC is situated within the context of the firm and strategic management - the knowledge of employees, customers and the organization collectively leveraged within a formally structured framework to create new and potentially exploitable knowledge (Edvinsson and Malone, 1997; Stewart, 1997).

Research is presented in terms of an evolving field with two dominant theoretical positions – with capital perceived in terms of a product or process. Product capital is the most developed of the two areas, with practitioners focussed on more tangible forms of IC outcomes - such as returns from new software/hardware and improving services to customers. In contrast, process capital looks at ways to improve efficiency, productivity and sales. Education - in the form of individual learning and knowledge management is thought to generate both product and process capital, although the latter role is characterized as underdeveloped. There is concern that technology is viewed as the solution to what are generally considered management related issues.
CHAPTER III - CONCEPTUAL LENS AND FRAMEWORK

3.1 INTRODUCTION

This focus of this chapter is the study's conceptual lens - intellectual capital, first introduced as a strategic approach to managing knowledge in the literature review. The concept is developed from a broad definition into a generic taxonomy, expanding on learning and sectoral perspectives raised previously. The resulting framework and assessment parameters provide structure for the presentation and discussion of findings. The chapter concludes with a summary of influencing factors and contention with regard to design and implementation.

3.2 DEVELOPING A DEFINITION OF INTELLECTUAL CAPITAL

Building on the previously broad perception of IC - where knowledge owned by employees, customers and the company is leveraged to create new forms of knowledge or capital - emphasis is now placed on the interplay of process and outcome. Specifically, employees interacting with customers, using the facilities, forums and resources provided by companies, whereby any new understanding and/or subsequent improvement to services, products and organizational processes is considered intellectual capital. This new knowledge is assumed to have potential and therefore a value for both employer and employee (Bontis, 1996; Dearlove, 1998; Edvinsson and Malone, 1997; Stewart, 1997).
3.3 TAXONOMY

Adopting a synthesized perspective, IC is structured into three forms or types of capital: human, customer and structural (Brooking 1996; Edvinsson and Malone, 1997; Stewart, 1997). The success of a knowledge management strategy and in this instance, intellectual capital, is thought to be dependent on how efficiently human and customer knowledge is transferred to capture systems and structures - structural capital (Dearlove, 1998). Under the premise of leverage - and central to the IC perspective, this process must, by extension be an open system, whereby the collective knowledge of an organization is continually updated and supplemented (Kennedy, 1998).

3.4 THE ANALYTICAL FRAMEWORK

3.4.1 Business Context: Small and Medium-Sized Computer Service Firms in B.C.

The inclusion of a business context deviates from the taxonomy outlined previously. However, establishing an operational context is considered imperative to developing a sector specific perspective of using learning and knowledge to leverage commercial opportunity in smaller high tech firms. In the absence of a formalized set of criteria to apply, the study turned to other work on learning and knowledge management in SMEs
3.4.2 Human Capital

Human capital is conceived in terms of the contribution employees make in realizing a firm’s commercial goals, considered in relation to attributes, knowledge, experience and skills employees and managers need to meet the company’s commercial goals and benefit themselves. Stewart (1997) views this process in terms of “the capabilities of individuals required to provide a solutions to customers” (p.76), translated by Brooking (1997) into “the goal” or reason why a company decides to measure intellectual assets. The contribution of employees is typically assessed in relation to need, expressed through the evaluation, competency and efficiency of performing specific tasks and meeting business objectives (Saint-Onge, 1994; Brooking, 1997; Edvinsson, 1997 and Stewart 1997).

Perspectives

Work on SMEs suggests the primary area of contention here relates to the type of training used in determining overall intellectual capital, and whether the training and professional development expenditures of large international companies leave smaller companies

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4 Growth patterns include: nature/pace of growth; no. of employees; and the type/location of markets
strategically disadvantage. For example, research indicates that training levels in SMEs tend to increase with size (Betcherman, 1997), yet few firms in British Columbia either aspire or reach the 60 employee mark, with equally low numbers reporting the existence of training budgets (Schuetze et al., 1997). In high tech sectors, informal and just-in-time training are the preferred knowledge management strategy, with little of the competence and commitment suggested by Ulrich (1998) as an organizational prerequisite for human capital to assume a principal role in the development of intellectual capital.

When considering the innovative contexts found in the computer service sector, Davenport and Prusak’s (1998) perspective on managing knowledge “introduces an element of caution with regard to over-management of employee knowledge, drawing on Nonaka and Takeuchi’s work on “The Knowledge-Creating Company” (1995), and the concept of ‘requisite variety’, whereby different levels of experience and skills encourage opportunity, rather than providing excuses for failure. In evaluating skills and experience, there is a danger of overlooking the intrinsic characteristics of innovation in an attempt to measure the effectiveness of a process that occurs at the margins between mind-sets, rather than the jurisdiction of one particular knowledge and skill base (Leonard-Barton, 1995).

Assessing Human Capital

The criteria used to assess human capital relate to the ability of employees to perform tasks and meet business objectives and include “the creativity and innovativeness of the
organization" (Edvinsson et al., 1997), although business context and organizational culture have also been identified as important factors, particularly in smaller high tech firms where managers typically work within shorter product life-cycles, have less training, resources and strategic partnerships than their larger counterparts (Betcherman, 1997; Baldwin, 1995; Schuetze et al., 1997).

Edvinsson (et al., 1997) views human capital in terms of skill, experience and capture. The emphasis is on need, evaluation, competency and efficiency, with organization culture and leadership central elements in the policies, strategies and structures developed to exploit their employees knowledge base. Specific areas include hiring policies, upgrading the skills of the existing work force, dissemination of knowledge, and measurement of knowledge management initiatives.

Developing Framework Parameters

Within this context, the primary objective is to determine why, when and how companies evaluate, acquire, develop and manage both knowledge, and the learning that precedes its formation. Specifically, the policies, strategies and practices companies have in place for recruiting employees with specialized knowledge (hiring practices), upgrading or developing workforce skills and expertise (training and professional development) and the dissemination of knowledge (knowledge management).
Drawing on strategies for owning human capital, the discussion incorporates the strategic role of trust and commitment in developing human capital, looking for specific linkages to the individual work culture and value systems of both managers and employees (Edvinsson, 1997; Ulrich, 1998). Specific questions relating to hiring practices, training and professional development and knowledge management include:

1. Hiring practices -
   - The type of knowledge, skills and experience in demand
   - Strategies and factors influencing the final hiring decision

2. Training and professional development -
   - Formal policies, statements and procedures – budgets, tracking and evaluation
   - The organization and forms

3. Knowledge management -
   - Formal policies, statements and procedures
   - Organization and forums – creation, access and transfer of knowledge

Summary

Human capital is the sum of the knowledge owned by employees - used by firms to achieve commercial goals related to products, services and organizational processes. Major influences on the creation of human capital are business and innovative contexts, organizational culture, hiring polices, skill development and the presence, and measurement of sector specific knowledge management initiatives. Commercial goals are related to supporting innovation, which this framework centres in the improvement or creation of products, services and business processes (Stewart, 1997).
3.4.3 Customer Capital

While human capital is centred in the value of employee knowledge, the focus of customer capital is the relationship between a company and its customers—"the value of its franchise, its ongoing relationship with the people or organizations to which it sells" (Stewart, 1997:143). Customer capital is the most recent addition to the IC and there exists a certain degree of skepticism with regard to the assessment of a relationship, which accounting areas would prefer to view in terms of tangible returns relating to sales and returns to investment in training rather than needs, expectations and potential.

Perspectives

Calls for a more inclusive form of stakeholder or relational capital have also been voiced (Kiernan, 1995; Ulrich, 1998). Here, all forms of external relationships and sources of knowledge would be formally valued, thereby including strategic partners, business counterparts and research labs. The potential impact of this change on smaller high tech companies is significant, in that limited resources often require the exploitation of any and all networking and inter-organizational relationships. Studies indicate that strategic partners typically start out as clients or customers, thereby justifying inclusion (TIA, 1997; Schuetze et al., 1997).

This is an interesting development for educational institutions seeking to clarify the business – education continuum, in that contributions of co-op students would now
assume a tangible and expanded role within ‘the collective’ of intellectual capital, assessed for contributions to both a human and relational perspective, in that students bring skills and knowledge that can be added to the collective experience. By extension, this also justifies further allocation of resources to improve both the quality of the individual, organizational experience and knowledge capital.

In terms of the relationship to innovation, Leonard (1995) reiterates Cohen and Levinthal’s (1990) stance that innovative capabilities are tied to the recognition, assimilation, application and linkage of new external information to commercial goals. However, moving from an exclusive customer capital perspective to a more inclusive, and by extension, broader relational base or external company networks, provides greater scope for examining the linkages between the development and subsequent exploitation of intellectual capital, types of knowledge and learning strategies, network formation approaches, and absorptive capacity.

Hommen (1995) stresses that in the case of network formation, inter-organizational relations and competitive advantage offer contrasting perspectives on the motivation behind external liaisons. In the former case, viewing interdependent networks as a structured, systematic and reciprocal response to scarce knowledge resources founded on mutual trust, while the latter is more of a contracted relationship, with each side responsible for specific non-transferable knowledge and key elements of a given project.
Assessing Customer Capital

The value or potential of customer capital is broadly perceived in terms of meeting company goals, with external (customer) networks identified according to role and the level, type, duration, extent and tangible returns of knowledge exchange (Leonard, 1995; Stewart, 1997; Edvinsson et al., 1997). The value of this relationship is thought to centre on the successful transfer of knowledge between the two with regard to needs and expectations. A necessary addition to the equation is organizational management, where opportunity amounts to an expression of perception, whereby the capacity to act rests in the ability of management to focus and channel expertise through what in high tech sectors amount to the “porous boundaries” (Leonard, 1995) encompassing technical, professional and R&D areas of the operation.

Developing Framework Parameters

The customer bond is discussed in relation to: the type and extent of corporate relationships - business relationships; the characteristics of learning and knowledge between companies and the importance of these relationships for innovation, learning strategies and evaluation of knowledge - innovation, learning and knowledge; and finally, the type of knowledge and learning needed to support these business linkages - developing support services (Edvinsson and Malone, 1997).\(^5\)

\(^5\) This group of factors is based on a set of customer metrics or measurements propose to measure the effectiveness of company-customer relations. Given the focus of the study on knowledge and learning modifications have been made to highlight these two areas of interest, Edvinsson and Malone, 1997: p 94-5
Specific questions relating to business relationships, innovation, learning and knowledge transfer, and providing support services include:

1. Business relationships -
   - Nature of knowledge relationships
   - Approaches and forms of knowledge relationships

2. Innovation, learning and knowledge transfer -
   - Influence innovation, learning and knowledge transfer
   - Encouraging customers to participate in the development and use of new knowledge

3. Developing support services -
   - Influence on learning and knowledge
   - Types of knowledge and learning situations

Summary

Customer capital is perceived in terms of how firms find, develop and make use of knowledge from “on-going relationships with the people or organizations to which it sells” (Stewart, 1997:143). The emphasis is on learning and knowledge transfer under conditions of high trust and mutual interest.

3.4.4 Structural Capital

Structural capital monitors, captures and stores both human and customer capital. It is the ‘embedded’ knowledge a company owns, where value is perceived in terms of monitoring, accessing and improving services, products and processes. Literature refers
to these ‘assets’ as codified and predominantly core knowledge, ranging from patents and copyrights, to firm strategy, culture, organizational infrastructures, products, protocols and procedures (Brooking, 1996; Edvinsson et al., 1997; Stewart, 1997; Dearlove, 1998).

**Perspectives**

While Booking’s taxonomy and subsequent methodology divided structural capital into two distinct, yet seemingly complimentary areas of infrastructure and intellectual property assets (Brooking, 1997), Edvinsson and Malone (1997) suggests there are actually three capitals - “organizational, innovation, and process” (p35). Facets are reduced to organizational policies, strategies, structures and practices for “speeding the flow of knowledge through the organization, as well as out to the supply and distribution channels” (p.35). This also provides the means for efficiently codifying and leveraging competence, and realizing the potential of existing commercial and intellectual property rights, assets and talents necessary to bring new products to markets. In essence structural capital deals with core knowledge, in that it “belongs to the organization as a whole” (Stewart, 1997:109).

A distinction also needs to be made between a commitment to formalize, capture and exploit knowledge, and having the organizational structures in place to either follow through and/or provide the type and degree of access an enterprise would need to have in place in order to function effectively. Here the innovative context, size and culture of a

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6 Brooking defines intellectual property assets as property of the mind which the company owns - and has legally protected. These include patents, copyright, design rights, trade secrets, trade marks..”
company has the potential to significantly impact not only whether, but what type of knowledge capture system a firm adopts, in conjunction with the strategic significance attached to knowledge management as a whole.

Assessing Structural Capital

Literature indicates a trend towards a process driven perspective of structural capital, centred in the amount and quality of human and customer knowledge generated through its structures and management. In terms of assessment, criteria used to assess the efficiency of this capture, transfer and storage process are typically categorized with regard to investment in the way work is undertaken, organizational factors assisting the speed with which knowledge moves through the company and customers, and the tangible assets that emerge from innovation (Brooking, 1996; Edvinsson and Malone, 1997).

Developing Framework Parameters

Structural capital is considered in relation to three groups of assets - organizational, innovation and process capital, which effectively drive, capture, monitor and provide access to both human and customer capita for the purposes of creating new knowledge. All three capitals are considered with respect to company competence and leverage (organizational capital), creativity and results (innovation capital) and work efficiency (process capital) (Saint-Onge, 1996; Edvinsson and Malone, 1997; Stewart, 1997; Bontis,
Specific questions relating to organizational, innovation and process capital include:

1. Organizational capital
   - Investment in the knowledge infrastructure
   - Structures and forms of knowledge systems and tools

2. Innovation capital
   - Protection of knowledge and creative talents
   - Structures and forms of protection and encouragement – creation of knowledge

3. Process capital
   - Monitoring the efficiency and productivity levels of knowledge systems
   - Structures and tools – systems and methodologies

Summary

Structural capital is knowledge owned by, and of value to a company. The creation of intellectual capital is thought to rest in the efficient transfer of human and customer capital to capture systems and structures (Dearlove, 1998). These ‘tangible’ capital assets cover a wide range of areas, ranging from proprietary rights to organizational documentation. Attempts to divide structural capital into distinct areas reflect an often practical need to differentiate between structures and products - and evident in the differentiation of organizational, innovation and process capital. This reflects the expectation of efficiency attached to developing IC into a management tool (Brooking, 1996; Edvinsson and Malone, 1997).
3.4 LIMITATIONS OF THE FRAMEWORK

In deciding on the analytical framework for the study, the evolving nature of the intellectual capital field poses a challenge with regard to both interpretation and translation of concepts and methodologies. While the central tenet of IC is 'leverage', a concept with inherently economic connotations, the frameworks and methodologies lean towards professional areas of practice and scale, with emphasis on supporting these functions and operations. Within this context, the framework represents a conservative interpretation of the literature - a synthesis of major viewpoints, drawing heavily on work by Edvinsson and Malone (1997), Stewart (1997), and Brooking (1996), while acknowledging the market driven lens of knowledge and learning advocated by Davenport and Prusak (1998), Leonard (1995) and Kennedy (1996).7

Intellectual capital is approached as a process - comprised of human, structural and customer knowledge or assets, subject to both internal and external influences. The creation of new knowledge is viewed within the context and definition of an innovative state or outcome. The overall taxonomy reflects the approach of Saint-Onge and work undertaken at the Canadian Imperial Bank of Commerce (CIBC), rather than Edvinsson's strategy for managing the knowledge base at Skandia. Literature on the business and learning contexts of SMEs suggests the latter is too inclusive and unrepresentative of the importance smaller high tech firms attach to customer knowledge and feedback (Schuetze et al., 1997; TIA, 1997).

7 For overview of framework see Appendix D.
The remaining area of contention for the study and framework is the positioning of strategic partnerships and other collaborations - normally included as facets of both human and structural capital. The operational characteristics of SMEs in British Columbia, outlined in both academic and industry studies (Schuetze, et al., 1997; TIA, 1997), suggest a broader context and role for external sources of knowledge than any one IC approach proposes, while even Edvinsson (1997) speculates on the apparent inconsistency of considering strategic relationships any less valuable than those of customers. However, this remains more a question than an generally accepted tenet of intellectual capital. Given the commitment to a generic framework, strategic relationships remain a criteria of human and organizational (structural) capital.

It is anticipated that discussion of the study’s findings will provide further insights into this and other possible limitations of the intellectual capital framework when applying its structures and processes to the knowledge and learning needs of innovative small and medium-sized high tech companies. From an educational perspective, the approach most suited to establishing a learning perspective embraces ‘intangible’ processes, affording the inclusion and attachment of learning to commercial goals.
CHAPTER IV - METHODOLOGY

4.1 INTRODUCTION

This chapter outlines the methodology used in the study. The form and extent of data are discussed in relation to the case study interview schedule and a broader based provincial survey tool\(^8\). The chapter concludes with limitations of the study with regard to use of secondary sources, age of the data and bias.

4.2 STUDY DATABASE

This section of the chapter outlines the creation, use and limitations of data used in the study. Examined are the objectives and methodology of the study from which data are taken. Case study and survey tools are reviewed in relation to research protocols, quality of data and access to primary data sources. The chapter concludes with limitations of the study data, which includes factors such as the use of secondary data, age of the database and bias.

\(^8\) For the interview schedule see Appendix A - survey tool see Appendix B
4.2.1 Origin of Database

This study draws on data from research into knowledge and human resource management in small and medium sized enterprises in British Columbia (Schuetze et al., 1997). The decision to use an existing database is based on three interrelated factors: a shared interest in the topic of how small, innovative firms handle their knowledge and human resource needs; questions that solicited the type of data useful to the present study; and the first hand involvement of this researcher in all facets of the project. The study in question examined the relationship between innovation, skills and learning in four industrial sectors of the province: secondary wood products, engineering consultants, telecommunications and computer services. The present study draws on data from only one of the original four industrial sectors: computer services.

4.2.2 Case Study Design

Case studies elicit information relating to both the “strategic, operational and organizational decision making processes and arrangements of firms” and the “learning projects undertaken by employees and work groups in relation to both general organizational strategies and specific processes of innovation” (Schuetze et al., 1997).

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9 This researcher was involved in project interviews, analyses and write-up of the computer service sector, survey design, final report and industry seminar.
4.2.3 Interview Guide

The interview guide is a source of data for:

- company history - business context and strategies;
- economic activities - the nature, context and exploitation of innovation;
- learning and information gathering;
- and the strategies, structures and practices surrounding human resource development. 

4.2.4 Quality and Limitations of Data

One of the four participating companies failed to provide full documentation. Incomplete areas of information include organizational charts, details of firm history, formal human resource and training policies, and compensation packages. While certain aspects of these areas are covered in interviews, with project commitments often in excess of eight hours per firm, few companies were prepared to answer additional questions. To ensure the credibility of data and accuracy of anecdotal and on-site observations, two of the four team members were required to attend each interview.

There was also concern over the bias or objectivity of interview data. The research team had little influence over who was to be interviewed. However, computer service firms

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10 Actual interview schedule sections: firms profile - business environment, relationships and innovation; employment - human resource management and skills; organization structures, decision making and learning; training and human resources development.
appeared open to the suggestion of interviewing employees, although deadlines and schedules often precluded more than summary contact. There were notably exceptions, in at least two instances companies spent either the entire day or a number of afternoons with members of the research team.

4.2.5 Access to Case Study Data

Case study data takes the form of questionnaires, interview tapes and transcripts. Questionnaires were used primarily to develop initial business profiles of case study companies before interviews took place.

4.3 SURVEY: INTRODUCTION

The survey is an addition to the original research design with very narrowly conceived objectives related to issues surrounding labour market trends, policies and initiatives raised by the project advisory committee after receiving the initial case study report. While the report in question focussed on examining the underlying processes driving organizational, learning and human resource characteristics and practices, it was suggested that incorporating data on sector counterparts had the potential to significantly broaden the audience of the project.
4.3.1 Survey Design

The survey tool consists of a one page overview of the project and three sections of questions covering three areas of case study analyses: company and business profile; innovation; and skills, learning and training.

Company /Business Profile

This section looks into business practices and characteristics providing details of firm markets, alliances, use and extent of professional memberships and evidence of formal organizational tools used in increasing efficiency. Firms were also asked to include organizational charts to compliment those either presented by firms or compiled by team members in response to questions on organizational structures.

Innovation

The focus of section two is why and how innovation takes place in companies, looking specifically at the characteristics of innovation. Survey questions relate to specific elements, sequencing or characteristics of products, strategies and clearly defined processes of innovation.
Questions in this section focus on hiring practices, work organization and the learning and training strategies innovative, small and medium-sized companies adopt in order to achieve their business goals. Objectives included: determining hiring priorities with regard to the perceived value of attributes and specific skills; whether management favours employees working as teams or independently; and the extent to which training and learning have been accepted as integrated and accountable aspects of a smaller company’s overall business strategy.

4.3.2 Survey Database – Computer Services Sector

The computer service base database has been compiled from government, industry and business sources: B.C. Stats.; Technology Industry Association (TIA); Software Productivity Centre (SPC); Business in Vancouver (BIV); industry and government representatives; and the business contact database of this researcher.

4.3.3 Distribution of Survey

The survey was mailed to a random selection of 66 computer service firms with 10 - 100 employees. Firms with under 9 and over 110 employees were eliminated prior to the first round of firm selection - 25 or 37.9% of returns were usable. Usability was determined in relation to the number of questions completed.
4.4 LIMITATIONS OF THE DATABASE

Using data from an existing data base precludes the opportunity to re-visit interviewees and by extension, to exert any influence over why and how questions are drafted or presented. While not involved in the initial conceptualization of the project and subsequent interview guide, this researcher attended all the computer service interviews, with opportunities to both ask and follow-up on questions and assumed responsible for overseeing the design, dissemination and response to the survey.

There may also be an issue of credibility given data was initially collected during the 1996/7 period. In this instance, the focus is one of expanding the parameters of a conceptual and framework rather than the creation of new data, making the quality and range of information of greater importance to the researcher. It should be noted that the Innovation, Skills and Learning database represents one of the first comprehensive studies undertaken into the knowledge and management of human resources in innovative, small and medium-sized enterprises in British Columbia.

The potential for personal bias is of concern in every study. In this instance, the researcher is employed in a small computer services company likely to benefit directly from the findings of the study. However, bias has to be viewed in terms of potential, and what the researcher has access to, and control over. In this instance the potential for in-built bias exists in the database itself, originating with the questioning of case study participants, and concluding with the preparation and interpretation of the questionnaire.
results. However, the project team was comprised of four people and at least two members were required to attend each interview. Copies of the draft survey were also circulated to case study firms for feedback. The only aspect of bias not under ethical control relating to the professional knowledge shared with team members during discussions and editorial meetings. The presence of industry advisors on the project and the dissemination of draft copies to case study companies constitute project safeguards.

From a contrasting perspective, a concern noted by both an industry advisor and company manager was the issue of industry background, and whether team members were in a position to interpret interviews accurately. There were questions with regard to the possible impact this might have on developing the type of ‘working knowledge’ perspective relevant to the intended business audience.

Finally, the age and size of both the firms and sample involved in the study might raise questions. The majority of computer services firms in British Columbia have less than ten employees, and four case studies represent a very small snapshot of a sector comprised of thousands of companies (BC Stats, 1996). The response rate of the survey firms is also modest, with only 25 or 37.9% of companies responding providing usable responses.

To address these concerns it is necessary to return to the objectives of the original study, where the absence of firms in B.C. with over 100 employees prompted interest in developing comprehensive profiles of smaller, successful and well established organizations. The intent was to review the experiences and conditions found in well
established, innovative firms thereby providing 'the majority' of smaller enterprises with insights into addressing growth issues. To this end it was decided not to include firms under five years old with less than ten employees. It was felt that the depth and quality of data provided by firm interviews would provide invaluable insights not hitherto available to policy makers by virtue of the time constraints and limited resources SMEs cite as obstacles to participating in case study research.

In terms of survey returns, difficulty in finding firms willing to act as case studies suggested managers might be reluctant to spend time on answering detained questions. It was recognized that previous to this survey, the majority of industry survey instruments had followed provincial and federal formats, which provide for generalized and guided responses, rather than requiring managers to reference files for details of practices, budgets and employee qualifications. Managers were clearly accustomed, comfortable and prepared to respond to commercial or conventional business questions of firm size, revenues, markets and strategy. However, few appeared ready to tackle questions relating to processes such as innovation, professional development and training. Consequently, emphasis was placed on the quality rather than the quantity of returns. Given the survey was intended to act in a supporting capacity to case study data, rather than the precursor to further research, the low response rate was considered acceptable and somewhat characteristic of the sector in question.11

11 Validated by TIA survey (1998) - a sample of 174 firms resulted in 30 responses or 17% return rate.
CHAPTER V - FINDINGS

5.1 INTRODUCTION

The study findings are presented using categories adopted in the framework for analysis:

- business context
- human capital
- customer capital
- structural capital.

Outlined are the policies, structures and forms of learning - in conjunction with the acquisition, nurturing, development, management and exploitation of knowledge in small and medium-sized computer service firms in British Columbia. Case study companies form the core of study findings\textsuperscript{12}, supported by sectoral data taken from a broader and more limited provincial survey.

\textsuperscript{12} For detailed business profiles of case study firms see Appendix C.
5.2 BUSINESS CONTEXT

5.2.1 Case Study Profiles

The commercial activities of the four case studies range from the development of in-house specialized systems (C-2) to contracted third party cross platform software (C-1) and embedded systems (C3-4)\footnote{Contracted third party cross platform — refers to software that can be used with various operating systems and hardware, designed for specific clients and not owned by developers; embedded systems — where software and hardware are integrated within a single product.}.

C-1 was founded in 1992 as a partnership by its present owners and has enjoyed dramatic and sustained growth, particularly in the U.S. The company operates within a niche market, developing software components for industry giants such as Microsoft and Corel. In contrast, C-2, founded in 1981, is the most established case study firm with a history of corporate buyouts of the company and uneven development. The company is currently a single proprietor and employee managed enterprise, specializing in geographic information systems for resource companies involved primarily in forestry and mining, and experiencing slow but sustained growth.

C-3 and 4 are distinct from C1-2, in that both enterprises have developed embedded applications, representing two contrasting degrees of acceptance and success. C-3 was founded in 1988, as a spin-off from a large international concern and is owner managed. The company builds and markets dispatch systems for taxi and courier service, and
reports dramatic growth over the past four years, due in part to industry connections and research partnerships formed as a result of a close working relationship with the former owners.

In contrast, C-4 develops credit and debit card transaction processing systems and hardware within a market primarily controlled by financial institutions developing their own competing systems in a rapidly evolving and relatively untried commercial area of applied technology. Founded in 1990, the company is expanding slowly as it develops new commercial applications. This is the only case study firm to have gone public.

Case study managers cite challenges to growth that include: high rates of personal taxation; competition for a limited pool of technically skilled workers with eastern Canada and the U.S.; poorly developed capital sources; inexperienced management; and a lack of corporate vision. While all four companies have developed extensive marketing literature outlining corporate vision and business mission, expressed in terms of growth history, values and work ethic, two of the four firms (C1-4) are actively pursuing new corporate visions for their organizations in response to growth, maturing markets for products and emerging technology.

5.2.2 Survey Firms

At the survey level, firms are typically limited companies with 10-25 employees. The majority of companies are experiencing rapid annual growth rates in excess of 50%,
while 80% of firms report national and international markets for their products and services. The U.S. market is a major and expanding source of revenues. Over 60% of firms report membership in a professional organization, used primarily for marketing and/or information resources. Survey firms demonstrate a broader use of the tax credit programme than case studies, however, all companies report frustration with the procedures and decision making timeframes. Research grants and government funds are used by the majority of survey and case study firms, although there is no clear preference for one particular funding source.

5.3 HUMAN CAPITAL

5.3.1 Hiring Practices

Hiring practices are reviewed in relation to the types of knowledge, skills and experience in most demand, and the strategies and criteria firms employ to determine suitability. Based on firm evaluation criteria, prospective employees are differentiated into three distinct categories: entry level applicants, those with 3-8 years of employment in the industry and seasoned professionals with a minimum of 10-15 years of experience.

5.3.2 Types of Knowledge, Skills and Experience in Demand

Within case study firms, entry level applications are considered in relation to specific technical knowledge, while those with 3-5 years experience in the industry are expected
to have a broader range of knowledge with respect to both emerging technology and sector counterparts. In the mid-career range, a broad based knowledge of the industry and business related areas is valued, with emphasis on organizational infrastructure, marketing and management, although managers indicate few people are hired at this level, due to cost, potential clashes in work culture and lack of availability.

In the areas of personal attributes and non-vocational skills, in the ability to adapt and function as a team player are highly valued at both the entry and 3-5 years of experience levels, while a good attitude, motivation and work ethic are also considered desirable assets. Familiarity with the logistics of project and/or team work are also imperative for those with a few years of industry experience, particularly the ability to meet deadlines, although discussions with case study managers indicate firms have yet to develop methods for formally evaluating these prerequisites, other than placing great emphasis on the interview process. Self-sufficiency and motivation are also considered important assets. In more experienced or seasoned applicants, project management skills are the most highly prized and sought after skills, although case study managers indicate a clear preference for in-house expertise over hiring from the marketplace.

In the area of business related skills, case study firms expect entry level applicants to be briefed in a broad range of technology, although not necessarily conversant with the operation and use of specific application software or hardware not in use by the company. Interpersonal skills are considered as important as technical abilities, while only 12% of survey firms rank it as a number one demand skill. Interest in management related
abilities is ambiguous. Only 8% of survey respondents rank management skills as their number one choice, although 64% mention relevance to their operation, which corresponds closely with the perception of case study firms. In the 3-5 year category, prospective employees are expected to be conversant with firm specific technology and to have developed a full range of interpersonal skills, with emphasis on customer support and project management areas. Where firms hire at the senior level, applicants are typically employed for exceptional management and interpersonal skills.

At the entry level, all employers are looking primarily for full-time employees with industry experience, although preference is shown to co-op graduates companies employed as students. Case study managers considered this practice to be an efficient use of limited resources, significantly reducing what were perceived to be longer period of adjustment and lower productivity normally present in graduates from programmes without work experience components.

Within the sector as a whole, 56% of companies value job specific experience, yet industry relevance is also considered an asset, mentioned in at least 80% of responses. In the 3-5 year category job specific experience was important. Firms also look for a broad base of industry related experience. Applicants for senior positions are typically hired based on industry and business expertise, although case study firms indicate a preference for either promoting from within, or hiring short-term consultants.
5.3.3 Strategies and Factors Influencing the Final Hiring Decision

Case study firms have two main strategies for recruitment, word of mouth and co-op programmes. Company employees are also an important source of information regarding available or potential employees. Firms report little success using newspaper advertisements or job fairs as a means of recruitment.

Managers place greater emphasis on interviews rather than an applicant’s technical curriculum vitae, looking for evidence of a potential ‘fit’ with the prevailing culture, well developed interpersonal skills and sound work ethic. C-1 describes this search in terms of looking for “young rocket scientists - bright, driven, in love with software development, as good with people as a driven software developer can be..” and prepared to “do what’s necessary to get the job done”. In the 3-5 years experience group, the ability to meeting project deadlines and previous employment with customers or competitors are also highly valued by prospective employers – in the latter case, specialized knowledge of competing products and culture is considered useful to future marketing and sales.

Other factors influencing the hiring decision include the employees expectation of:

- an informal work environment/ flexible hours
- a suitable remuneration package/profit sharing – share options
- career advancement
- challenging work.

Overall, companies cite the need to respond to product development, industry shortages, limited resources and company fit as driving forces in the hiring process.
5.3.4 Training and professional Development

Formal Policies, Statements and Procedures

At the firm level, companies lack formal training and professional development policies, although there are informal guidelines or explicit, yet generalized understandings in place, regarding when and who is trained. Training is recognized as important yet not formally integrated into organizational business plans and strategies. C-1 is closest to achieving this integration, with management “support(ing) the passion and drive to learn” - maintaining that “being in the knowledge business any investment you make (has the potential for) a very high return” - yet the company has no formal policy to support the existing training budget of $1000 per employee, per annum. At the sector level, Table 1. indicates that while 80% of firms report integrated training and professional development into their business plans, it is the 20% of firms operating without a plan that have budgets, track expenditures and evaluate outcomes.

<table>
<thead>
<tr>
<th>Training and Professional Development</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral Part of Business Plan</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Budget</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>Track Expenditures</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>Evaluate Outcomes</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 1. Training and Professional Development – Characteristics
Firms cite improved employee skill levels as the main incentive to undertake training, although increased productivity is also a significant factor. Case study firms also report factors such as efficiency and the competitive advantage offered by a well trained workforce, while survey respondents included employee satisfaction. Two of the case study managers (C1-2) felt they were more likely to retain employees if the company provides the opportunity to keep skills and knowledge current. Only one of the four firms (C-I) has a training budget ($3000 per employee, per annum and a dedicated training room) and none of the firms formally track or evaluate training outcomes. Training is also viewed as a strategic response to industry skill shortages, whereby smaller companies nurture and develop knowledge in-house in response to what C-2 refers to as the inability to match “what government…and big industry pays…”, the brain drain to the U.S., and clients “hiring (employees) out from under us”.

Organization and Forms

The majority of training undertaken by both case study and survey firms is informal, just-in-time, technical in nature and in-house. Less experienced employees receive the bulk of training, which tends to be highly specialized and in response to a specific commercial needs identified by management. Professional training is comprised of informal mentoring or formal public sector education, the latter of which, managers leave to their employees discretion, although firms often subsidize formal courses and graduate work. “providing it’s not to build a log cabin” (C-1).
Where formal training is undertaken, companies usually contract private sector services and offer courses on the premises. This is the preferred option when large numbers of employees need training. Survey data also indicate, that while nearly half of the survey firms have used professional organizations to meet their training needs, none have turned to public sector services.

Two of the four case study companies (C1-4) have experienced an increase in professional development at the senior levels. In both cases, managers and owners are using consultants to assist them with organizational visioning, intended to facilitate a change in company direction and mission. C-1 has also invested heavily in administrative training in response to operational upgrades, with management opting for formally structured courses offered by private sector trainers.

Within this context, C-4 openly question what the firm considers is an over emphasis in public policy on technical knowledge and skills, while “the everyday skills it takes to run the company” are marginalized. One senior manager asks why government “can’t work with companies to move ahead. What we’re suffering from…is the (lack of) management skills…even (in) sales and marketing. It’s those things, as opposed to high technology…they should be working on the incubating the management people that operate the industry.”

Case study firms show interest in virtual training, particularly in specialized and emerging technical areas (C-1, 2 and 3), although time constraints have tended to curb
enthusiasm for the time being. One of the companies (C-1) makes extensive use of industry training, offering employees access to product certification programmes, technical upgrade conferences and market release events offered by clients, manufacturers and suppliers. Overall, employees make the majority of requests for training, while project managers or senior management are responsible for deciding the merit of claims.

5.3.5 Knowledge Management

Formal policy, Statements and Procedures

Case study firms adopt an informal approach to managing knowledge. The broad sentiment expressed by management towards knowledge is summed up by C-2, where management maintain, “it’s not the company or the software that counts it’s the brains. We want the brains and there’s all sorts of ways to do that – joint marketing, joint ventures, partner ownership, full ownership or just hire them …”. However, there are no formal policies and statements relating to the acquisition, nurturing, development, access and exploitation of knowledge in relation to commercial goals and objectives. In contrast, procedures for handling both core and peripheral knowledge are in place, with goals and objectives related to supporting corporate operations, services and products.
In case study firms, knowledge is organized according to function - operations, products and services. Core knowledge relating to organizational history and procedures, products and services is stored in both hard copy and disc form. Companies indicate that the principle objective of core knowledge is supporting the following business and administrative functions:

- accounting – audits, business plans, finance;
- marketing – data for use in preparation of promotional material;
- legal – contracts, strategic partnerships, intellectual property rights;
- products – specifications, manuals, upgrades;
- services – ‘how to’ guidelines and protocols – customer support;
- training – manuals and outlines;
- recruitment and orientation of new employees.

The extent to which companies document knowledge varies, although supporting products and services is a cited priority. Of all the case study firms, C-3 is the most emphatic that “the thicker your documentation up front, with your customers for example, the better you’re going to turn out in the end”. Managers indicate they protect sensitive areas of material relating to legal, financial and areas of R&D. The other end of the spectrum is present in C-4, where “our policy is to have no procedure documentation, no policy documentation” rather to have “on one hand a list of beliefs that we have in the company and any situation that comes up, we just go back to those. Does it tie in with
our long-term focus, does it meet with our delivery of services to our customers. If we can't answer any of those things, then we shouldn’t be doing it”.

Firms provide examples of organizational (knowledge) forums that are both formal and informal in nature. In the latter, retreats and socials, brainstorming and mentoring are the three most prominent forms of informal learning opportunities, cited by both case study firms and survey respondents. C-1 and 2 report utilizing these forums in support of a broader organizational strategy of building trust and promoting an informal and relaxed hierarchy. Formal arenas are comprised of structured interactions for the transfer of knowledge, which include:

- monthly and weekly company briefing sessions providing overviews and feedback on projects, deadlines, new work, clients and issues;
- project management meetings;
- technical update seminars – reports from internet sources, conferences, industry shows and training, supervision, and project or R&D brainstorming sessions.

Both case study and survey firms report external knowledge networks in which employees access or attend:

<table>
<thead>
<tr>
<th>Survey respondents - %</th>
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<tbody>
<tr>
<td>publications</td>
</tr>
<tr>
<td>internet web pages/groups</td>
</tr>
<tr>
<td>professional/sector seminars</td>
</tr>
<tr>
<td>trade shows</td>
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<tr>
<td>university /government labs</td>
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<tr>
<td>academic conferences</td>
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Managing external sources is viewed as an essential aspect of supporting technical
development and innovation, with approaches that often rely upon what C-3 refers to as
"translator(s)", whereby technical, sales and theoretical stakeholders rely upon key
employees to recognize, convey and make firm specific, otherwise narrowly focussed and
specialized knowledge. The growth of internet sources is also considered integral to
managing knowledge, with employees making extensive use of the net to download
technical data from clients and suppliers, track trends and exchanging ideas with industry
counterparts.

5.4 CUSTOMER CAPITAL

5.4.1 Business Relationships

Nature of Knowledge Relationship

Case study firms have established close knowledge links with customers. In survey firms,
44% of companies regularly exchange information with customers, while 92% cite
customer feedback as integral to development work. Presently, firms recognize these
relationships through strategies and structures rather than formal policies, although
marketing material either alludes or specifically makes reference to the role customers
play in building overall business and development strategy.
Three of the four case study firms (C-1, 2 and 3) cite financial dependence on a small number of key customers, while clients have funded development work in all four cases. Overall, firms seldom upgrade products without significant input from users, although at least one company (C-3) was of the opinion that “clients don’t always know what they want”.

Managers are typically looking for ways to move firms towards a more independent and market driven development trajectory, while still retaining the customer revenues needed to sustain day to day operations. Within this context, C-1 has developed a pilot R&D unit to explore emerging areas of technology using revenues from existing projects, although there is a degree of skepticism at the mid-management level regarding the financial viability of this approach. In contrast, C-4 has a goal of including a service component to its emerging applied focus, in an effort to produce a “re-occurring revenue stream”, although the organization concedes management lack the basic sales and/or marketing skills and knowledge necessary to build the customer base of an unproven technology.

Approaches and Forms of Knowledge Relationships

Employers value customer knowledge as an asset, vital to the improvement of service and products. While the degree of this involvement varies, C-3 exemplifies how close the relationship can be, explaining, “we have a company which is in business with its customers and the customer becomes the central focal point (of) what we are offering the customer and it works back from there...”. However, approaches to customer support
vary. Although firms such as C-2 and 3 devote resources to improving the performance levels of support staff, which managers contend, strengthens the operational link between developers and clients (C-2), this type of investment is normally incorporated under costs incurred by on-going projects rather than knowledge or learning related. In contrast, C-1 restricts access to clients, with the majority of work undertaken remotely, rather than at client sites. Customer input typically goes through one member of senior management, a response the organization explains in terms of leaving developers to develop with little need of specialist support training.

Customers provide support for their products and innovation by providing detailed data on performance and possible modifications. Firms encourage customers to ‘buy into their vision’, with one firm (C-4) insisting that developing trust ensures future co-operation. Customers have also been used to beta test or trial new versions and/or upgrades of products.

5.4.2 Innovation, Learning and Knowledge

Influence on Innovation, Learning and Knowledge Transfer

Case study firms view their client relationships as a cost-effective approach to innovation, whereby customers provide often unsolicited suggestion for improvements and new products. However, despite these benefits, managers also indicate concerns over the narrow focus of creativity and the danger this dependency poses to future R&D,
whereby companies commit to an applied focus using technology and knowledge significant to existing clients rather than predicting and planning for future needs and opportunities. The exception to this is C-4, where a predominantly R&D focus has resulted in a need to first sell the concept, then devote resources to developing applications.

Information flows are most intensive during the beta testing or firm trials, where results are closely monitored and documented. Given the need to go through a consultative process with clients, innovation is more likely to be systematic, a characteristic also cited by over 50% of survey firms. Serendipitous innovation is evident in at least three of the case study firms (C-1, 2 and 4), where resources for R&D and communities of practice are flourishing independently of formally stated commercial goals.

The predominant form of learning is situated within groups or project teams, where members share their new, and often tacit knowledge via informal discussions and mentoring. At the organizational level, more structured approaches are evident in the form of seminars and weekly update meetings – used to transfer information and data gathered from sales, marketing and technical support. The former also represents the predominate work organizational form in this sector, chosen by 48% of firms surveyed. Case study managers also indicated that it is not uncommon for personnel to move between customers and service providers, which provides firms with additional specialized knowledge and skills, yet also represents a significant loss of peripheral
knowledge, in that few of the techniques developed for ‘handling’ clients have been
formally documented.

Where customers are also industry leaders (C-1) technical expertise and knowledge are
continually upgraded in order to both maintain and win contracts. Some of this learning
takes place off-site and is structured within formal training and ‘arranged’ social
interactions with industry counterparts. This is followed by in-house sessions, where
knowledge is transferred to the organization. C-1 describes this process in terms of “we
just send down a bunch of people down to San Francisco for the Apple World-wide
Developers Conference and then we went to the Microsoft World-wide Developers
Conference ....where they divulge a lot of information...and some of the people put on a
presentation on what they discovered, so in terms of sharing information, it’s kind of an
individual information gathering (session) and then we try to share it with the group”.
Firms report that many of these contacts go on to become ‘off-shore’ technical sources -
members of virtual and informal industry networks or extended communities of practice.

5.4.3 Developing Support Services

Influence on Learning and Knowledge

Case study firms place emphasis on the skills, experience and specialized knowledge
needed to staff their customer support lines or negotiate at senior levels, although in the
former, managers cite high turnover rates due to stress and lack of both personal and
professional satisfaction.
Types of Knowledge and Learning Situations

Support staff are required to demonstrate extensive core knowledge relating to products and protocols in conjunction with well developed interpersonal skills. Employees are usually trained on the job via mentoring or close supervision and learning is typically incremental, and not formally evaluated. While both C3 and 2 have developed support units, C-1 remains the only company to introduced a rotation system in an effort to retain the specialized knowledge and expertise of their support staff – their peripheral and company specific knowledge. Presently, management estimate support staff only stay with the company 2-3 years and generally leave at a time when they have achieved a high degree of credibility with both customers and development employees. Others firms expect developers to support clients on an on-going basis, with very little training outside of normal company meetings and seminars.

5.5 STRUCTURAL CAPITAL

5.5.1 Organizational Capital

Investment in the Knowledge Infrastructure

Case study firms indicate an awareness of the role of organizational infrastructure, however, knowledge is not a formally recognized as a process with a distinct organizational structure, goal or budget. One company (C-1) has made a substantial
investment in a new administrative support system – in response to an increased volume
of work and a resistance to hire and train personnel who are neither technical or billable.
Firms typically make impressive and substantial investment in knowledge infrastructure
related to technical areas and customer support, with administration and business
functions relegated to secondary importance. The most significant investment being made
by any of the firms is improving connection to the internet - to access on-line technical
sites, although there are indications that firms prefer employees limit their ‘surfing’ (C1-
3).

Structure and Forms of Knowledge Systems and Tools

Company knowledge infrastructures fall into three categories: technical, customer
support and business related. Technical knowledge is typically incorporated through:
seminars, meetings, self-directed learning, email, access to manuals, strategic
partnerships and the internet. Additional external sources of knowledge for case study
firms include links to:

Survey respondents - %

- business partners 44
- suppliers 16
- public sector sources; 92
- academic and government sources 48
- trade shows/seminars and publications 96

In contrast, knowledge used to support services and products rests in structures that
facilitate mentoring, supervision, specialized training and access to core knowledge
relating to product specifications and protocols. Business knowledge is located within administrative systems, while case study managers tended to view the development of skills, expertise and overall acumen as a by product of mentoring and on-the-job experience. There is also knowledge from external sources and described by C-2 as a situation where “our primary sources of information (are)...our technical support groups with clients...Secondary sources...would be through sales and marketing, where they are telling us what people are asking for” and by extension, what competitors are offering.

Computer systems are primarily used to store core knowledge. Managers focus on supporting administrative, business and technical functions related to services and products. None of the case study firms has a dedicated knowledge manager, although three companies (C-1, 2 and 3) have hired administrators and it is common to have a technical specialist overseeing communications and other specialized networking functions.

Case study firms have extensive intranets operating, although at least two of the firms (C-1 and 2) admitted technical documentation was incomplete, with the majority of manuals in hard copy form rather than on database. The latter circumstance is attributed to the rapid rate of redundancy within technical areas. Less than 20% of survey respondents and no case study firms have used structured methodologies such as ISO14. Firms cite cost, complexity and narrowly conceived structures inappropriate to smaller firms as factors influencing their decision, although at least one company (C-1) showed interest in

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14 International Standards Organization - certification programme for business
facets of the programme with regard to establishing more efficient administrative reporting structures.

5.5.2 Innovation Capital

Protection of Knowledge and Creative Talents

Protection of knowledge takes two predominant forms, legal and in-house. Case study firms view the legal protection of knowledge from contrasting perspectives. Firms involved in embedded technology have concerns about intellectual property rights and recouping investment capital, yet only C-3 has obtained a copyright. The remaining companies either work for customers who own the legal rights to software and hardware developed or thought the process redundant (C-4).

In terms of in-house knowledge, management appear most concerned about limiting access to contractual areas of business transactions, personal files or technical specifications provided at the onset of a contract. In contrast, creative talents are consciously encourage and protected by investing in strategies for retaining employees.

Structures and Forms of Protection and Encouragement

Structures in place to protect knowledge and encourage creative talents can be categorized as technical and cultural in nature. Managers report that employees are
expected to formally codify technical specifications to ensure that work can be replicated. Companies also stress the role of interactions with mentors, colleagues, customers and industry counterparts as an efficient means of exploring emerging ideas, sharing specialized knowledge and building expertise, with C-1 going to the expense of installing a T-1 line down to Microsoft "so we have email that flows continually".

All four case study firms view innovation as a corporate activity. Managers refer to the importance of retaining employees over trying to document what they know, which the majority feel changes too rapidly to be an effective strategy. Major obstacles to retaining knowledge are identified as boredom, burn-out and limited career opportunities. Strategies for retaining skills, expertise and knowledge centre on providing incentives to stay, some of which are strictly financial, while others focus on working conditions, career development, challenging work and culture. Management frequently pay above average salaries, offered buy-in options and profit sharing as a means of retaining key staff. Other strategies include developing a more informal and open style of management, opportunities to work on personal interests, improving documentation procedures, recognition and tangible support for communities of practice and flexible hours.

In the area of professional development firms indicate an awareness of limitations surrounding a flat organizational structure, demonstrated by the experiences of both C-1 and C-4. C-1's attempts to satisfy promotional aspirations of mid-level managers

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15 Dedicated telecommunications line.
resulted in junior partnerships being offered and then withdrawn when negotiations broke down over liability issues, while the latter (C-4) provided an organizational chart which indicates nearly every member of the firm is a manager responsible for at least two or three functions - a characteristic also present in at least two thirds of survey returns. Both companies acknowledge management will need to expand their professional expertise and overall business acumen in order to satisfy further career demands of employees.

5.5.3 Process Capital

Monitoring Efficiency and Productivity Levels of Knowledge Systems

None of the case study companies are formally monitoring the efficiency of their knowledge systems. However, written responses indicate that in at least three cases (C-1, 2 and 3), learning is viewed as a major influence on both efficiency and productivity - identified as a priority in terms of improving overall competitiveness. At the sectoral level, 72% of survey respondents view training as an effective means of improving productivity, while 50% make a further connection to innovative capacity and organizational knowledge - this contrasts with the 40% who evaluate training outcomes.

Structures and Tools

Managers provide no indication that any formal structures or tools are in place to monitor knowledge systems, rather a compartmentalization of reporting, comprised of
facets from the learning and knowledge processes found in training, professional
development and expenditures on systems and hardware.

5.6 SUMMARY

Small and medium-sized computer service firms in B.C operate within dynamic and
rapidly expanding international markets. Companies have become adept at accessing
public sector sources of funding and marketing information, while avoiding what are
perceived as more structured and long-term relationships embodied in public sector
education and training.

In the area of human capital or employee knowledge, firms are looking for employees
with the right blend of education, skills, technical expertise and attributes, preferring co­
op students at the entry level. When hiring at more advanced levels, project management
skills and specialized knowledge become assets, while companies prefer to promote from
within to fill senior positions, where industry experience and business acumen are valued.
Professional or management development is typically viewed as an individual, rather than
firm responsibility, although mentoring is thought to promote the type of skills and
expertise necessary to assuming greater responsibility. Training plays a significant role
in the knowledge management strategies of smaller computer service companies, with
firms under pressure to expand their technical expertise by either acquiring or developing
new knowledge in order to maintain their competitive edge. However, while the majority
of firms report training to be an integral part of their business plans, few firms have budgets, evaluate outcomes or track expenditures.

Firms value the role of customers in developing knowledge strategies and innovation, with close collaborations existing between customer support groups and users. The need to assess, collect, evaluate and document discussions has influenced the characteristics and forms of innovation and learning, whereby innovation tends to be systematical in response to a steady, process centred input - while learning is often incremental, with employees slowly building a critical mass of knowledge and expertise. However, employers are working to lessen the impact of customers on innovation by developing a broader technical knowledge and client base.

In terms of the infrastructure supporting organizational goals, innovation and learning, companies are looking for ways to improve ‘how’ new products and services are developed. Managers perceive innovation and knowledge creation as a normal part of ‘doing business’, showing little or no interest in facets of structured methodologies intended to impose order on administrative functions - citing incompatibility with regard to cost, time, formality and company culture. Polices and strategies are typically informal and often exclude technical systems and work related processes. Firms allocate resources to protecting the technical assets of people rather than making substantial investment in a learning infrastructure, using financial and work related incentives to retain employees.
CHAPTER VI - DISCUSSION OF FINDINGS

6.1 INTRODUCTION

This chapter examines the findings of the study, applying the intellectual capital perspective of leveraging the knowledge found in human, customer and structural capital to create new forms and expressions of understanding or capital.

6.2 HUMAN CAPITAL

From the intellectual capital perspective, human capital relates to the contributions employees make to a company’s viability in terms of creating new knowledge and innovation from previously held skills, expertise and understanding. Within this context both case study and survey responses suggest that, while managers view the knowledge of workers as imperative to the creativity and innovation that drive commercial success, the majority also perceived this potential and dependence as an inherent quality of high tech business and therefore an integral part of their survival. Thus, while knowledge may indeed be a specialized asset important in the improvement of services, products, services and new technology, few companies formally acknowledge the link to commercial goals outside of promotional material extolling the virtues of doing business with a ‘learning organization’.
It is also apparent that not all knowledge is valued equally. Technical and related cognitive areas of 'know how' are the most openly acknowledged, heavily invested in, and exploited areas of corporate learning and knowledge. Firms indicate a preference for loosely structured learning situations, where the objective is clearly one of making tacit knowledge explicit, although there are no formal statements to this effect. Companies are also transferring and capturing both peripheral and core knowledge pertinent to on-going development and emerging areas of technology. In contrast, skill, expertise and acumen inherent to business and administrative functions suggest that systematic knowledge is poorly represented at the management level, narrowly conceived within a 'when and if we have the time and resources scenario', rather than linked to commercial goals of improving products and services.

Managers explain this emphasis or preoccupation with technical knowledge in terms of the vulnerability associated with decreasing shelf-life of products, rapidly emerging technologies and the need to keep current in order to compete in expanding international markets. A contrasting perspective might portray these characteristics as symptoms of ill-conceived goal setting, where owners not only fail to establish a realistic vision and value for knowledge but lack the expertise to formulate broad based strategies to manage human resources. Given that companies expect these operational conditions to be a continuing and essential element of high tech sectors, the absence of a long-term knowledge management strategy likely to facilitate a considered response rather than a abrupt reaction to what amounts to normative operational conditions, appears to be something of a contradiction in purpose.
Interviews elicited responses suggesting owners and managers often lack the management skills and business acumen necessary to leverage or guide firms through growth periods. There is an awareness of how inexperience has the potential to seriously impede the creation of new knowledge, innovation and business related goals, yet few act to formulate even informal strategies with regard to what and how employees should aspire to learn and ‘know’ in order to enhance and manage what is an inherently learning and knowledge-based process.

Great emphasis is placed on the role and expectations of mentoring in professional development, yet case study firms show little evidence of allocating resources to train and support the counseling roles assigned to senior staff. Also noticeably absent, is the presence of an evaluation procedure to determine the type or extent of professional development the company might benefit from. Presently, managers indicate a disaffection for business related training, citing ‘just-in-time’ requirements, lack of time and cost, inconvenience, relevance and confidentiality. The trend is one of contracting the services of experienced industry consultants to assist in specific problem areas of the organization. This is a knowledge transfer and leverage strategy managers appear to find more palatable for expanding their expertise - rather than participating in what are perceived to be more structured and time consuming public education programmes with broader educational goals.

The inconsistency of purpose is also evident in responses to staffing needs, where the preferred response is to acquire knowledge, skill and expertise, rather than invest in, or
utilize in-house resources. However, industry skill shortages have required firms to re-
think strategies for meeting their technical knowledge needs. The demand for skilled
workers often precludes finding suitable applicants on demand, or the expectation that
firms could afford to pay ‘the going rate’ even if they were successful in finding suitably
qualified applicants. Consequently, smaller computer firms have been compelled to
consider training as a means of both nurturing and developing knowledge, although the
overall absence of policies, budgets and evaluation procedures suggests that the learning
taking place will likely remain an intangible, inaccessible and under-exploited corporate
asset.

Further concerns centre on the extent of leverage firms achieve from training and other
forms of situated learning such as technical seminars, project meetings and monthly or
weekly information sessions. Firms appear proficient at organizing structured learning
opportunities and forums for the broad transfer of technical knowledge, yet fail to
evaluate whether either employees or mentors have the skills necessary to both transfer
and capture what they hear and see, or that relevant core knowledge has been codified,
stored and is accessible.

Interviews suggest firms leverage the hiring process, introducing a filter for resolving
issues relating to learning and potential, with expectations changing in relation to years of
experience and position. At the entry level co-op students and graduates are given priority
over less experienced or conventionally educated applicants. The decision to hire is often
strategic rather than reflecting a sense of professional commitment to train future

colleagues found in other professions. Firms use co-op students to fill vacant positions and leverage both present and future potential, although few explain their hiring practices within this context. Firms indicated a clear preference for former co-op employees they felt they had already trained and only participate in co-op programmes when there are full-time positions to fill. A more recent and additional filter to the hiring process is the value of personal attributes in the employment decision. The team focus of work within the computer industry has resulted in little tolerance for technically brilliant but socially inept proteges with few or poorly developed interpersonal skills, whereby peripheral knowledge would likely remain elusively tacit and inaccessible to both team members and the organization.

In essence, firms are making a statement that previous experience and acclimation to their workplace, no matter how fleeting, has value and can be used. Less acknowledgement is evident with respect to the specialized knowledge both students and graduates bring to the workplace, which has a tendency to be shared with either project members or more likely, fellow entry level workers, rather than with the corporation as a whole.

The challenge for firms looking to manage the knowledge of their employees appears to centre on reversing the existing preconception that usefulness to the organization has to be immediate, thereby avoiding the propensity to undervalue, prejudice and isolate tacit and peripheral knowledge, before the company has the opportunity to determine the nature and extent of the assets at their disposal.
6.3 CUSTOMER CAPITAL

Customer capital is centred in the value of knowledge owned by clients, which the intellectual capital perspective views in terms of the quality and extent of knowledge transferred between a company and their respective clients. Both case study firms and survey respondents indicate that management invest heavily in these knowledge relationships, although policies are often more clearly defined by marketing materials than in formal statements – articulated and accessible to all employees. Companies appear to have considerable problems reconciling goal setting (knowledge) with the type of systematic reasoning and analysis necessary to move organizations from tacit forms of understandings to explicit forms of protocols, procedures and documentation.

The development of customer capital is dependent on the smooth interaction of three service functions, present in the feedback clients provide on the performance of existing products and services, suggestions for new development work and technical support. The level of dependence between the two groups has resulted in the establishment of specialized support units, where employment criteria specifically targets previous knowledge, skills, experience and attributes.

In the case of new employees, applicants are expected to have enough industry experience and/or leverage skills to significantly reduce the amount of time it takes to bring productivity levels in line with the rest of the customer support unit. However, the process of determining the suitability of applicants is often individualized by the rotating
nature of hiring responsibilities, which results in a predominantly subjective choice, rather than the outcome of a predetermined set of criteria. In contrast, existing employees are expected to have developed a sufficient competence and understanding of firm specific and/or proprietary skills and knowledge to enable responses to both procedural and technical questions. In both instances well developed interpersonal skills, initiative and a sound work ethic are prerequisites for employment, although how these characteristics are conceptualized and subsequently evaluated is unclear, with managers unable to provide details of existing guidelines.

Learning in support of these functions is predominantly situated with employees mentored by senior employees, conversant with both the technical and service roles of customer support. Support staff also act as mentors to the organization via formal reporting procedures, informal discussions and structured opportunities to share ideas and expertise. Problematic is the absence of dedicated supervisors and review procedures for assessing either the effectiveness of learning taking place, the technical competence of employees or the quality and impact of information from customers. Nor is there evidence to suggest that management are monitoring the effectiveness of either supervision or procedural links with other business functions with regard to how increased levels of productivity might be used to improve overall learning capabilities, rather than specific product and service related processes.
6.4 STRUCTURAL CAPITAL

Structural capital moves the focus of knowledge ownership away from people to the organization. Specifically, the potential of the assets contained within organizational structures developed to support competence, innovation and learning processes. These structures act as conduits for the movement of human and customer knowledge through the company, a process that case study findings suggest, pose the greatest challenge for smaller high tech companies looking to maximize the creative talents of scarce human resources.

The development of organizational structures is firmly rooted in the previous experiences and present visions of company owners, directors and managers. Case study findings indicate that the majority of management come from larger corporate backgrounds with specialized units and personnel devoted to handling the intellectual assets of the corporation, where the mission, skills and expertise underlying learning and knowledge strategies have not been shared with the organization as a whole. There is little evidence to suggest that either managers or employees are in the habit of reflecting on the value or appropriateness of leveraging these experiences to address existing operational conditions.

Within this context, the position of learning and knowledge related support structures appears closely tied to the extent and level of management’s exposure and involvement in these earlier encounters with knowledge management. At the case study level, findings
indicate that whereas organizations are actively exploring new forms of managing the business and people who work for them, knowledge creation is considered in terms of 'what and why' they do, rather than 'how' they do it.

Ostensibly, the forums for nurturing, developing and transferring knowledge and the skills, expertise and intellectual material that drive its formation, reflect an awareness of both the leaning processes and importance of monitoring, capturing and accessing human and customer capital. Managers also relate these learning structures to the innovation process and strategies for encouraging learning climates conducive to creating and improving products and services.

Closer examination of motivating factors behind existing learning structures and approaches point to the overriding influence of organizational culture. Specifically, the predominantly informal management style and reporting system that pervade the perceptions, forms and practices employed to meet the expectations, learning and knowledge needs of management, employees and customers. Additional ambiguities are evident in data relating to improving aspects of work, where increased levels of training, efficiency and productivity are all considered important organizational goals, yet at the case study level, not directly equated with the need to introduce formal knowledge management strategies. Approaches for managing knowledge can therefore be viewed as attempts to reconcile what companies feel they must do in order to survive with the type of work environment people want to work within, whereby success is evaluated in relation to 'what is', rather than 'what could' be achieved.
6.5 THE DEVELOPMENT OF INTELLECTUAL CAPITAL

Findings highlight the operational dichotomy smaller computer service firms face with regard to the value attributed to learning and knowledge in terms of meeting the needs and expectations of the business 'they are in', versus those attached to the business 'they run'. The development of new knowledge or intellectual capital is problematic when companies fail to reconcile these two positions.

While at least two case study companies appear to be aware of what they need to do to capitalize on the knowledge at their disposal to further products and services, there is little evidence to suggest that either is close to formally recognizing learning and knowledge as interrelated aspects of both functions, with skills, expertise and intellectual material transferable to a broad range of functions, rather than relevant to one particular area of the firm’s operation.

Similarly, although both case study and survey companies talk of improving efficiency and productivity, the former provide no evidence of developing the means of identifying, planning, budgeting or evaluating either the nature, effectiveness of long-term objectives and outcomes of these goals with respect to creating new knowledge or innovation.

Without all three facets of human, customer and structural capital operating in unison, it is doubtful whether smaller high tech companies will be in a position to leverage assets at their disposal to achieve the level of synergy necessary to create levels of new knowledge
capable of improving or developing new products. Present attitudes and approaches to each area of capital, where flat corporate structures, informality, project based work situations, shared areas of responsibility and often poorly trained management have resulted in a situation where companies appear to accept a 'tacitly explicit' approach to learning and knowledge. Policies are codified, only in the event that it becomes a strategic necessity - most notably, when commercial goals such as marketing, new clients or searches for capital require companies to impart corporate values and operating practices, and seldom involves developing a broad consensus using the leveraged expertise and/or support of the organization as a whole.
CHAPTER VII - CONCLUSIONS

The study framework affords a clear profile of how innovative, small and medium-sized computer companies view the place of learning and knowledge in HRD. Findings reveal a dynamic operating environment, completely engrossed in the possibilities of the technology driving products and services. Evident is a neoclassical perspective, whereby the increasingly short shelf life of applications and hardware often creates pressure to rationalize support for R&D against the potential of more immediate gains - present in existing technology. To these companies innovation is an inherent quality of their business, rather than a complex learning process comprised of distinguishable facets of learning and knowledge.

Within this context, a premium value is placed on new forms of knowledge with an obvious potential to improve the level and quality of information, skills and experience necessary to support commercial products and services. Broader professional development goals related to improving overall efficiency and productivity are acknowledged, yet consistently and systematically marginalized. The onus is on both management and employees to keep current and creative within their respective technical area, with training resources and rewards closely tied to improving technical proficiency. In contrast, professional rewards are more to do with expedience than the result of a structured and evaluated career strategy.
Further evidence of structural informality is evident in the lack of codified knowledge, which corresponds to the disaffection for regulations and formality present in many smaller high tech companies. Firms typically devote time and resources to the nurture, development and exploitation of employee knowledge - while actively encouraging knowledge transfer between customers and other external sources. However, few take precautions to formally capture and preserve peripheral knowledge before attrition and/or memory loss take their toll. The emphasis and value is on immediate relevance rather than future needs - a sentiment that pervades high tech organizational culture.

Perhaps the most problematic areas of knowledge highlighted by the analysis are those encompassed by customer and structural capital. These are also areas where this particular framework falls short of providing a clear structure for reviewing the full range of external sources of knowledge available to small and medium-sized high tech firms - sources that are currently diminished by division into three categories.

At this juncture, the propensity for smaller high tech firms to overlook or simply ignore the need to develop formal policies, strategies and practices has become an overall characteristic of organizational culture. This can, in part be attributed to the lack of professional training found in this sector, where managers acknowledge a lack of business acumen - with limited knowledge of operational strategies. Firms also report difficulties gaining access to resources intended to assist in resolving the business problems of rapidly growing companies. However, given case study data on levels of educational attainment and career paths, it appear the present knowledge void and
operational predicament facing managers are not centred in either a lack of formal education or basic competencies. The industry appears to be more the victim of its own fast pace, lack of professional standards and prestige – in a global economy increasingly dependent on the products and services it provides.

The informality of smaller computer service firms appears to have impacted evaluation systems and the corresponding negative impact it has had on monitoring and/or evaluating outcomes. This is a limiting factor in all three areas of human, customer and structural capital, and by extension to the development of intellectual capital itself. The extent of the contradiction of purpose - between stated goals of efficiency, increased productivity and organizational change are apparent in human capital, where firms consistently overlook the leveraging power of senior employees. Despite efforts to promote the benefits of co-op education with its strong emphasis on mentoring, value is typically compartmentalized within functional parameters related to operational areas, rather than supervisory and mentoring roles. The impact of managers marginalizing their own human capital potential is a clear, if often unintentional message to junior employees that technical knowledge and experience is valued, while industry and business acumen is a necessary but more obscure area of professional development - unrelated to what makes money for the corporation.

Presently, smaller high tech firms display an awareness of what they need to do in order to 'get by', yet lack the trust, incentive and 'know how' to invest in processes and structures that will enable management to ensure tacit knowledge is articulated, captured
and formally incorporated into organizational culture and processes rather than merely stored - used only in the preparation of business plans and/or promotional material.

Thus, innovative small and medium-sized computer service firms can be characterized as narrowly conceiving the value and role of learning and knowledge in human resource development in terms of products and service, rather than organizational - learning processes. Determining the extent of this under-evaluation is impeded by the existing disciplinary bias and operational context of many IC methodologies. The intellectual capital approach currently reflects conditions found in larger and more structured corporations with well developed customer databases and tangible forms of structured capital – which in turn effectively undervalues the potential and often accrued returns to emerge from external relationships and applied or commercial applications of existing technology.

TOWARDS AN ANALYTICAL FRAMEWORK FOR SMES

With respect to developing a value for learning within the operating context of SMEs, this study points to shortcomings in two areas of the IC perspective: the extent, role and integration of external sources of knowledge and the attachment of commercial goals to the creation of intellectual capital. The former is a direct response to existing studies on high tech sectors and SMEs - which highlight both the significance and often integrated nature of external relationships. The latter is a necessary precursor to developing an educational and process centred perspective of commercial value, capable of formally
incorporating facets of a particular learning approach – such as contextual and situated learning.

External sources of knowledge

External sources of knowledge are evident in all three areas of capital: relevant to human capital by virtue of the influences employees are exposed to; forms the basis of customer capital - with previous studies clearly showing external relationships are a major knowledge source for smaller high tech firms where development costs effectively inhibit extensive in-house R&D; and in structural capital, due to linkages with strategic partners, industry counterparts and research units.

While larger organizations may have the resources to approach knowledge needs from this more compartmentalized perspective, separating and then reintegrating these facets is more problematic for smaller organizations with limited resources and management structures that typically require senior personnel to assume two or three operational roles. In these situations it would be more useful to combine all sources of external knowledge under one area of capital or assets - accepting that certain forms will be more tangible and ostensibly valuable than others. The issue of whether subsequent indicators can be developed to capture this value is separate to that of recognizing the crucial role these ‘knowledge’ relationships play in the creation of intellectual capital.
The value of intellectual capital is comprised of the products, services and processes improved or created. The focus of existing work on the relevance of intellectual capital parallels the preoccupation study firms demonstrate for tangible outcomes - which, in a technology sector effectively marginalizes the processes that underlie the acquisition, nurturing, development, management and exploitation of knowledge. Given human resource development is centred in potential, the goal of understanding the learning and particular forms of skills, experience, intellectual material that employees draw upon to realize their professional objectives would appear to be a prerequisite to an organization’s commercial success - requiring equal standing with the products and services that emerge from their creative talents.

In order to facilitate change in the way learning and knowledge are valued, this study suggests establishing a commercial role for learning and knowledge that is clearly understood within the operational culture of firms, sectors and public sector infrastructures. The goal of an educational lens and approach would be to demonstrate the presence of a tangible and renewable benefit housed in the knowledge of employees - one with the potential to train, impact management practices and increase operational efficiency.
IMPLICATIONS FOR POLICY

The study has implications for a number of policy areas, the most notable of which include: public sector involvement in training and professional development; the role of professional and industry associations; and post secondary education - co-op and work experience programmes;

Public sector involvement in training and professional development

The computer service sector is adept at articulating the more immediate technical and professional needs of the industry and quick to suggest public sector roles. Absent is evidence of a corresponding sense of accountability with respect to matching public sector commitment and investment in educational infrastructure and associated processes – necessary to achieving the level of long-term self-sufficiency, increased productivity and improved business performance managers in both this and related studies cite as priorities.

Energies have typically centred on addressing perceived systemic educational deficiencies rather than focussing on the quality, characteristics and immediate implications of the often atypical learning environments present in the majority of smaller high tech firms. Little is known of either the extent or efficiency with which firms leverage either in-house knowledge sources or develop the structures supporting the learning process. Evidenced in this study, attempts to examine intangible aspects of
corporate culture and operations are often thwarted by firm imposed time constraints, the need to develop appropriate research methodology and both industry and government pressures to focus on educational outcomes and financial returns derived from products and services – rather than less obvious and/or profitable process related business facets.

The inherent liability of policies and initiatives intended to improve levels of technical and professional competence is that which presupposes firms are in a position to capitalize on these opportunities. This study shows that even successful SMEs often fail to formally acknowledge training and professional development programmes as legitimate costs of doing business - typically viewing expenditures within the context of a operational contingency, rather than an on-going commitment to skill and professional development.

A necessary prerequisite to developing a learning partnership with industry is the development of hitherto narrowly focussed and applied educational concepts and vocabulary into a commercial and process centred value-added perspective and methodology - suitable for monitoring and assessing the degree of commitment evident in firms. The goal - to place a tangible value on in-house educational infrastructure, processes and outcomes rather than the products and services they support. Of importance are the reporting systems and/or structured methodologies that routinely fail to recognize and integrate these features – thereby inadvertently encouraging under-investment.
Strengthen the role of professional and industry associations in HRD

High tech industry associations have become major stakeholders in the policy process, playing an increasing role in articulating the training and professional development challenges faced by companies – often at the expense of professional associations such as CIPS, with a smaller membership, comprised of individuals rather than corporations and focused on more long-term career goals.

Creating a climate in which associations have ready access to policy makers may have increased awareness of skill shortages in the computer services sector – and impacted the form and extent of institutional response, yet the question remains whether associations have a mandate or ability to impact educational practices in the sector as a whole. This study clearly demonstrates that smaller firms view industry association memberships in relation to strategic goals – motivated by subsidized rates, central locations and the more immediate commercial gains offered by access to marketing expertise and specialized management/business seminars with immediate relevance. There is still little sense of a commercial centred role for the learning process present at either the firm level or integrated into industry association literature - only the obligatory rhetoric that knowledge is the key to commercial success and suggestions for improving management skills. Policies that envisage a broader educational and training role for industry associations appear unrelated to both the level of firm involvement and how managers currently perceive this relationship – bringing into question the influence exerted by the few organizations actively involved in developing industry positions.
Promotion of co-op and work experience programmes in PSE

The present relationship between the computer service sector and post-secondary educational policy is one based on both dependence and vulnerability to public sector institutions with regard to continuing education and supplying graduates with immediate value to operations.

In the case of continuing education, this and other studies show firms exhibit a clear preference for in-house training – only turning to the private sector to meet specialized technical needs. Preferred external providers of technical educational services are hardware manufactures, major software developers and internet sources, with managers viewing industry association in terms of a resource for gaining access to up-to-date information on the economy, technology sector, policy and related management issues. The few pursuing career education often turn to institutional degree and/or diploma programmes – with increasing options to engage in out-of-province or international distant education.

Co-op education is promoted as a viable strategy for addressing what are now acknowledged to be global, rather than localized examples of shortages in skilled technical and mid-management professionals. However, this study raises questions with regard to the direction of existing co-op and work placement polices and initiatives – directions that would seek to increase the numbers of placements in smaller computer
service firms with limited resources and managers who acknowledge a lack of expertise in HRD. There is little evidence to suggest smaller firms are leveraging the potential of existing employees or that senior workers possess the skills and expertise necessary to mentor inexperienced students requiring formal supervision and assessment. In contrast, there is data to suggest a long-term under-investment in the type of learning processes one might expect to find in knowledge-based sector. Most notably absent is the inclusion of educators in strategic planning and the widespread adoption of a learning/knowledge vocabulary.

It is incongruous to have work experience initiatives without having a method of reviewing industry rhetoric against the polices, self-help strategies and practices firms adopt to leverage in-house knowledge and learning, and by extension, the long-term viability of work experience programmes – initiatives that depend on co-operation and a cohesive organizational presence to provide a quality programme and suitable work situations for students.

FURTHER RESEARCH

The analytical framework forms the first stage of a process intended to produce a knowledge based and industry specific model of human resource development where learning is perceived in terms of a distinct and commercial exploitable strategy and organizational tool - rather than an assumed, intangible and inherently mysterious prerequisite to the exploitation of knowledge resources.
Acceptance and adoption at both the macro and micro level hinges on the ability to monitor and measure the characteristics and outcomes of intangibles, which this study suggests will require a greater distinction to be made between process and product facets of capital - something necessary to improve the understanding of linkages between knowledge, learning and work organization. Presently there is very little structural capacity evident that would readily afford for the meaningful integration of existing learning centred perspectives and processes present in approaches such as contextual or situated learning. Recognition of learning as a commercial goal with an intrinsic value-added component - supporting more tangible aspects of knowledge and intellectual property, would also provide for the inclusion of supporting policies and infrastructures into corporate and government reporting structures.

Within this context, further studies would benefit from the development of education/training databases centred in the concept of leveraging knowledge - with emphasis on why, when, how and the extent to which learning processes and related structural relationships are either considered and/or subsequently developed in pursuit of commercial opportunities. Of interest is tangible evidence of a corporate learning culture, defined in relation to: acknowledgment and presence in strategic planning; the articulation, use and integration of vocabulary and concepts such as core and peripheral knowledge, core capabilities, competency and attributes; and examples and methods of exploiting knowledge transfer – both in-house and external. This would significantly improve the ability to assess both the credibility of firm statements and the decision making processes in place with regard to the commercial value and exploitation of
learning – reviewing awareness of potential against the subsequent implementation of policies and monitoring structures. It would also afford the opportunity to build-in innovation indicators, size, industry specific characteristics and operating conditions necessary to the development of sector based best practice models.

This area of research and study also affords insights and a possible marketing approach for those involved in the provision of educational services – institutions and agencies increasing expected or mandated to respond to the workforce needs of innovative, small and medium-sized high tech companies.

One of the greatest challenges facing any industry/institutional relationship is the ability to establish a sense of mutual respect and understanding with regard to operational mandates and constraints. Given the contrasting conceptual boundaries present in educational and business, research into how an educational perspective of IC might be applied at the institutional level may provide greater insights into: how each perceives their respective role in policy formation and implementation of initiatives; the characteristics of knowledge leverage; the monitoring, level and extent of faculty commitment to an applied focus; and the necessary resource prerequisites to improving the quality and response of both firms and faculty to work-based programmes.

Further leverage would result from contrasting institutions with mandated links to business such as BCIT and Tech BC with more conventional academic settings and continuing education programmes. International comparisons, incorporating institutions
such as MIT (USA), QIT (Australia) and both Griffith (Australia) and Warwick (UK) Universities would serve a dual purpose - providing both a broader perspective and value to data and analysis, while responding to an increasingly expectation that studies be relevant to the challenges of an increasingly global educational marketplace and economy.
BIBLIOGRAPHY


APPENDIX A - INTERVIEW SCHEDULE

CASE STUDY FIRMS

1996

INNOVATION, SKILLS AND LEARNING
Phase One: Identification and Initial Profile of Firm Characteristics

Identification

Name of Enterprise: Address:
Telephone: Fax:
Contact: Telephone: Fax:

Are non-managerial employees in this enterprise represented by a union? Yes: _ No _
If yes, please indicate: Name of Union: Address:
Contact: Telephone: Fax:

Economic Activities

1) Enterprise's main field of industrial or commercial activity:
(a) Industry:
(b) Products and/or Services:

2) Location of markets for the enterprise's products (goods or services): (Please provide a percentage distribution of total sales for the past year.)

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td></td>
</tr>
<tr>
<td>Canada (outside B.C.)</td>
<td></td>
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<tr>
<td>U.S.A/Mexico</td>
<td></td>
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<tr>
<td>Europe/Japan</td>
<td></td>
</tr>
<tr>
<td>Elsewhere</td>
<td>100%</td>
</tr>
</tbody>
</table>

Size

3) What is the total number of employees currently employed by this enterprise?
4) What was the enterprise's total volume of sales in the past year?
Structure

5) Is this enterprise an independent company? Yes: _ No _

or,

part of a group of enterprises? Yes: _ No _

6) If it is part of a group, is this enterprise:

(Check one answer.)

• "parent" company?
• subsidiary company?
• "partner" company?

7) If this is an independent enterprise, is the largest single block of company shares owned by its executives or management? Yes: _ No _

8) Is this enterprise currently involved in any strategic partnerships, joint ventures or strategic alliances? Yes: _ No _

If so, please describe:

Innovative Activity

9) How many technologically changed products (goods or services) has this enterprise developed or introduced during the past five years?

Briefly identify any significant product innovations:

10) How many technologically changed processes has this enterprise developed or introduced during the past five years?

Briefly identify any significant process innovations:

11) Does this enterprise plan to develop or introduce any technologically changed products or processes during the next five years? Yes: _ No: _

If yes, please specify

Firm History

12) In what year was this enterprise established? 19
13) In comparison to 1990, has your enterprise experienced any change in competition from each of the following geographic areas? (Check one answer for each geographic area.)

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>More of</th>
<th>No Change</th>
<th>Less</th>
<th>Not a Source Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td></td>
<td></td>
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<tr>
<td>Canada (outside B.C.)</td>
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<td>U.S.A/Mexico</td>
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<td>Europe/Japan</td>
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<tr>
<td>Elsewhere</td>
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</tbody>
</table>

14) What was the total number of employees in this enterprise five years ago?

15) What was the enterprise's total annual volume of sales five years ago?

16) Has this enterprise been involved in any of the following activities over the past five years? (Check all that apply.)

- Merger and/or acquisitions
  - Yes (Year:)
  - No

- Strategic partnerships (equity-based consortia or joint ventures)
  - Yes (Year:)
  - No

- Strategic alliances (resource, research or marketing networks)
  - Yes (Year:)
  - No

17) Compared to five years ago, has this enterprise experienced significant change regarding any of the following characteristics? (Check one answer for each characteristic.)

- Yes
- No

Primary product or service
Degree of business competition
Controlling ownership of enterprise
Most senior manager of enterprise
Production/operating technologies
Foreign market orientation
Government regulatory requirements
18) Have there been any other changes which may have significantly affected your enterprise in the past five years? Yes No

If yes, please specify

19) Have any of the changes described in responses to Q. 13 - 18 had any of the following impacts in this enterprise over the past five years? (Check all that apply.)

Reorganization of work processes Increases in skill requirements
Increases in (gross/unit) labour costs Decreases in skill requirements
Decreases in (gross/unit) labour costs Increased contracting out
Workforce reductions Decreased contracting out

If so, please explain briefly:

20) Have any of the changes described in responses to Q. 13-18 affected the level of innovative activity (including both product and process innovation) in this enterprise over the past five years? Yes: _ No: _

If yes, please explain briefly:

Current Business Strategy

21) Which of the following best describes the current market for this enterprise's principal product or service? (Check one answer.)

(A) Stable ____ (B) Expanding ____ (C) Contracting ____

22) Are any of the following objectives included in this enterprise's current business strategy? (Check all that apply.)

Undertake research & development Reduce (gross/unit) labour costs
Increase employee skill levels Reduce other operating costs
Introduce new process technologies Reorganize work processes

Develop new products/markets Develop cooperative management-employee relations
23) In relation to the overall business strategy, what are this enterprise's present objectives with regard to the development or introduction of innovations? (Please indicate the current importance of each of the objectives listed below, using the following scale.)

<table>
<thead>
<tr>
<th>Level of Importance</th>
<th>none</th>
<th>alight</th>
<th>moderate</th>
<th>very</th>
<th>crucial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace obsolete products</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>EXTEND PRODUCT RANGE:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- in main product field</td>
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<tr>
<td>- outside main product fld.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- building market share</td>
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<td></td>
<td></td>
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<tr>
<td>CREATE NEW MARKETS:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- in British Columbia</td>
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<td></td>
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<tr>
<td>- in Canada (outside B.C.)</td>
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<tr>
<td>- in U.S.A./Mexico</td>
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<tr>
<td>- in Japan/Europe</td>
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<tr>
<td>- in other countries</td>
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<td></td>
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<tr>
<td>LOWER PRODUCTION COSTS BY REDUCING:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- wage costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- materials consumption</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- energy consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- product design costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- production lead times</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- environmental damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- product quality defects</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>- difficult work conditions</td>
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</tbody>
</table>

OTHER OBJECTIVE (please specify):
24) In relation to the overall business strategy, what are the main objectives of this enterprise's current Human Resource Development (HRD) strategy? (Please indicate the current importance of each of the objectives listed below, using the following scale.)

<table>
<thead>
<tr>
<th>Level of Importance</th>
<th>none</th>
<th>alight</th>
<th>moderate</th>
<th>very crucial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Upgrading employee skills</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hiring skilled employees</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hiring outside contractors</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Formal training programs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Informal training methods</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Organizational innovation</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
</tbody>
</table>

Phase Two; Section 1: **Environment, Business Relationships, and Innovation**

Environment

1) What are the most important factors shaping this firm's business environment?

How has this environment changed over the past five years?
How is it expected to change in the future?
How is this enterprise placed to compete in this environment?

2) What public bodies, industry-organizations, and professional associations have a strong influence -- either positive or negative -- on this firm's business activities?

How have these influences changed over the past five years?
How are they expected to change in the future?
How do these influences affect the competitive position of this enterprise?

3) What production/service technologies are used in this firm?

How old is the existing equipment?
How much of it is computerized?
How much technological change has taken place over the past five years?
What have been the major effects on employees' jobs and skills?
4) What production management techniques are used in this firm?
What have been the main effects on firm performance?
On employees' jobs and skills?

5) How does the firm's use of technology relate to its production management techniques?
Is the technology/management relationship similar in comparable firms?
Has this relationship changed over time?
Will it change in the future?

6) What changes have occurred within the firm's organizational structure over the past five years?
Have there been similar patterns of organizational change in comparable firms?
What have been the main reasons for organizational change?
What were the main sources of models or ideas for organizational change?
What were the main effects on firm performance?
On employees' jobs and skills?

7) How would you describe this firm's business strategy and explain its development over time?
How have the various dimensions of the firm's environment reviewed in Q.1 - 4 (that is, the business, institutional, technical, and organizational environments referred to above) - affected the development of the firm's strategy?

Business Relationships

8) What are the main resources on which this firm depends, what organizations are suppliers, and what agreements or relationships does the firm have with them?

9) What are the main resources that this firm provides, what organizations are the recipients, and what agreements or relationships does the firm have with them?

10) What are the main resources for which this firm enters into reciprocal or mutual exchange relations, what organizations are its exchange partners, and what types of agreements or relationships does the firm have with them?
11) Referring to the business relationships involving the supply, provision, and exchange of resources described in the answers to Q. 8 - 10, how would you describe the competitive position and innovation strategy of this firm?

A. - How have these relations changed over time?
B. - How does the firm gain access to new technology? How does it transfer new technology out of the enterprise?
C. - To what extent (and with whom) does this firm depend on developing and maintaining cooperative relationships as part of its overall strategy?
D. - How would you describe the innovation strategy of the firm in relation to the general context of its business relationships and business strategy?
E. - How does the firm protect competitive advantage in new products processes?

Innovative Activity

12) Please identify and provide a brief description of any technologically changed products or processes developed by this firm over the past five years.

A. Product Innovations

B. Process Innovations

13) What were the main sources of information that the firm used in developing these innovations and what kinds of information did these sources provide?

14) Did the innovations described in the answer to Q. 12 involve cooperation agreements of any kind with other enterprises or institutions?

15) What barriers had to be overcome in developing the innovations described in the answer to Q.12, and how did the firm overcome these barriers?

16) How would you describe the various products (goods or services) produced by this enterprise for commercial purposes in terms of their location across the product life cycle? What is the share of all sales for products at different stages in the cycle?

17) With reference to the classification of products (goods and services) described in the answer to Q. 14, what are the main improvements in either product design or production processes that are being made to, or planned for, these products?
18) For the last year of operation, what was the percentage distribution of total sales across the following types of product?

<table>
<thead>
<tr>
<th>Type of Product</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products that remained essentially unchanged</td>
<td></td>
</tr>
<tr>
<td>Products subject to incremental changes</td>
<td></td>
</tr>
<tr>
<td>Products that were new or significantly changed</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

19) For the last year of operation, what was the percentage distribution of total sales in new markets across the following types of product?

<table>
<thead>
<tr>
<th>Type of Products</th>
<th>Sales in New Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products that remained essentially unchanged</td>
<td></td>
</tr>
<tr>
<td>Products subject to incremental changes</td>
<td></td>
</tr>
<tr>
<td>Products that were new or significantly changed</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

20) How would you describe the general economic impacts of innovation on your firm in terms of costs and benefits? How does this compare to the industry at large?

**Research and Development -- Government Assistance Programs**

Research and Development (R&D) includes: *basic research* (experimental or theoretical work with no immediate focus on application), *applied research* (investigative work directed towards a specific aim or objective), and *experimental development* (applying existing knowledge to the production of new materials, products or devices, the installation of new processes, systems and services, or the improvement of processes, systems and services already produced or installed).

21) Can any of the innovative activities carried out by this firm be classified as R&D?

Please specify those innovative activities that can be classified as R&D.

22) If some or all of the firm's innovative activities can be classified as R&D has this firm ever claimed R&D expenditures under Revenue Canada's Scientific Research and Experimental Development (SR&ED) program?
23) What problems has this firm experienced in obtaining government support for its R&D activities, through either the SR&ED program or any other government assistance program?

Phase Two; Section II: Employment, Human Resources Management & Skills

Employment Profile

1) For each of the occupational categories listed below, enter a) the current number of full-time permanent employees, and b) the number of full-time permanent employees five years ago.

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>a) Current</th>
<th>b) 5 years ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management (executive and supervisors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional and technical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales and marketing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerical/office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other occupations</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Referring to the occupational categories listed above, please describe and explain any major changes (expansion, shrinkage, or fluctuation) in the overall level of employment over the past five years.

3) Referring to the occupational categories listed above, please describe and explain the extent to which there has been any significant change in personnel over the past five years, either through processes of attrition (retirements, quits, or layoffs) or through processes of accretion (recalls, internal promotion, new hiring).

4) Approximately how many distinct job classes - that is, groupings of jobs associated with a distinct pay scale -- for each of the following occupational groups a) currently exist in this firm, and b) existed five years ago? (Answer for each occupational group in this firm and briefly explain any significant changes.)

<table>
<thead>
<tr>
<th>Distinct job Classes</th>
<th>a) Current</th>
<th>b) Five years ago</th>
</tr>
</thead>
</table>
5) In comparison to five years ago, has the proportion of employment in each of the following non-standard employment categories increased, remained unchanged, or decreased? (Check one answer for each category. Briefly explain significant changes.)

<table>
<thead>
<tr>
<th>Non-Standard Employment</th>
<th>Increase</th>
<th>No Change</th>
<th>Decrease</th>
<th>N. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part-Time Workers</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Temporary Workers</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Temp. Agency Personnel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Independent Contractors</td>
<td>-</td>
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<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

6) How is non-standard employment currently distributed among occupational groups in this firm and how has this distribution changed over the past five years? (In answering, please refer to the categories of non-standard employment used in Q. 4 and the list of occupational groups used in Q. 1 - 3.)

7) Has the pattern of employment in this firm changed over the past 5 years?

Has it been:
- relatively stable,
- characterized by high levels of instability (fluctuation or turnover)?
or,
- has there been a division between stable and unstable employment?

(Please discuss with reference to the occupational groups listed in Questions 1 - 3.)

8) Do you foresee any significant change in this firm's pattern of employment over the next several years? Please explain.

**Human Resource Needs and Employment Practices**

9) What formal educational qualifications are looked for in hiring employees in different occupational groups and how have these expectations changed over time?

10) What kinds of previous job-experience are looked for when hiring employees in different occupational groups and how have these expectations changed over time?

11) What kinds of personality traits are looked for when hiring employees in different occupational groups and how have these expectations changed over time?
12) With reference to the different occupational groups, has this firm experienced any labour shortages (difficulties in maintaining an adequate complement of qualified and experienced workers) over the past five years? Please describe.

13) What are the strategies most frequently used by this firm to cope with job vacancies, and how have these strategies changed over time?

14) Has the use of the strategies re: vacancies described in Question 13 varied in relation to different occupational groups?

15) What are the employment practices used by this firm to attract and retain a skilled labour force -

16) Referring to the employment practices identified in the answer to Q. 15, please provide a brief discussion of:

   a) when, why and how these practices were introduced,  
b) how they have affected the operation of the firm,  
c) whether they have been supported or opposed by affected occupational groups,  
d) whether they have been supported or opposed by any other groups within the firm - e.g. management, Human Resources personnel, employee representatives.

17) Please indicate whether, internal promotion or movement to another firm is the usual pattern of career advancement for employees in different occupational groups.  (Answer for each occupational group in this firm.)

18) For those occupational categories whose usual pattern of career advancement is internal promotion, please indicate:

   A) whether internal mobility is limited to one job class or also extends to other job classes, and
   B) the criteria for promotion -- e.g., seniority vs. merit; credentials vs. experience.
Skill Demands

19) What kinds of non-vocational skills are required by employees in this firm?

Please discuss the requirements for these skills in terms of:

a) their importance to the firm and how this has changed over time.
b) whether the firm has experienced any shortage of these skills and
c) how those skills which are important to the firm are developed and maintained.

20) What kinds of firm-specific skills are required by employees in this firm?

Please discuss the requirements for these skills in terms of:

a) their importance to the firm and how this has changed over time.
b) whether the firm has experienced any shortage of these skills and
c) how those skills which are important to the firm are developed and maintained.

21) What kinds of vocational skills are required by employees in this firm?

Please discuss the requirements for these skills in terms of:

a) their importance to the firm and how this has changed over time.
b) whether the firm has experienced any shortage of these skills and
c) how those skills which are important to the firm are developed and maintained.

22) Are there categories of skill or knowledge important to the firm that have not been captured adequately by the terms used in Q. 18 - 21? Please discuss.

23) What have been the key factors determining changes in skill requirements within the firm over the past several years?
Phase Two; Section III: Organizational Structure, Decision-Making & Learning

Organizational Structure

1) What is the organizational structure of this firm?

Please assist the interviewer in drawing a "map" or flow-chart of the firm as a business organization, describing the division of labour and distribution of managerial responsibilities.

2) Referring to the map of organizational structure provided in the answer to Q.1, please discuss the distribution of expertise within the firm.

3) Referring to the map of organizational structure provided in the answer to Q.1, please discuss the coordination of activities within the firm.

4) What basic knowledge and understanding of the firm as a business organization are all employees expected to have?

   How has this knowledge evolved?
   How detailed is it?
   Does it vary in breadth or depth across different occupational groups or different parts of the firm? If so, how?

5) Which employees in this firm possess specialized knowledge about particular areas of the firm's business activities and operating environment?

   How has this knowledge evolved?
   How detailed is it?
   Does it vary in breadth or depth across different occupational groups or different parts of the firm? If so, how?
   Has this pattern changed over time? If so, how?

6) To what extent is there agreement or disagreement within the firm regarding the relationship between basic and specialized knowledge?

   Who usually agrees? Who usually disagrees? What are the reasons usually given?

   Does the pattern of agreement/disagreement vary across occupational groups or departments? Has the pattern changed over time? If so, how?
**Information Gathering, Analysis, and Strategy Formulation**

7) How does the firm go about gathering information related to its main business activities?

8) How does the firm go about analyzing information related to its main business activities?

9) How does the firm go about expanding and organizing its knowledge-base?

10) How is decision-making carried out within the firm?

11. How are important business decisions coordinated or made together with other organizations with which the firm is either affiliated or engaged in some form of partnership or cooperation?

12) To what extent are business decisions influenced or affected by organizations that regulate aspects of the business environment, including public authorities, industry or trade organizations, employers' associations, and organizations representing occupational groups, such as professional associations or unions?

**Innovation as learning**

13) Of the various significant innovations developed by this firm within the last several years, please identify one of the firm's most successful innovations and provide a brief account of how this innovation was carried out, from initial conceptualization to complete implementation or commercialization.

14) Referring to the innovation process described in the answer to Question 13, please comment on the extent to which common or shared experience was important to the success of the project.

15) Referring to the innovation process described in the answer to Question 13, please comment on the extent to which combining different bodies of information was important to the success of the project.
Phase Two; Section IV: Training and Human Resource Development

Organization of Training and Human Resource Development

1) How are responsibilities for Training and Human Resource Development (HRD) allocated within the firm as a business organization? (Provide detailed description.)

2) Has the organization of training and human resource development within the firm been subject to change over the past five years? If so, please explain how and why it has changed.

3) Does the firm have a formal policy regarding employee training and development? If so, please describe what this policy includes.

4) Has the firm's policy regarding employee training and development been subject to change over the past five years? If so, please explain how and why it has changed.

5) Does the firm develop any formal plans or objectives for employee training and development? If so, please describe and explain how such plans are developed.

6) If the firm has a written formal statement of training objectives and plans, what does this statement include?

7) How does the firm assess or estimate the training needs of employees?

8) Does the firm possess a training budget? If so, what items does this budget include?

9) How does the firm evaluate the impacts of training?

10) Has there been any significant change in the firm's approach to training in the areas of needs assessment, planning, budgeting, and evaluation over the last five years?
Decision Making, Funding, and Resource Allocation

11) In what parts of this firm are the decisions primarily made regarding the different aspects of training?

12) On what basis are individual employees usually selected to undertake training sponsored by the firm?

13) How are employees in this firm usually involved in training decisions?

14) On what types of training decisions is there usually significant employee input?

15) Does the firm participate in any community- or sector-based based training council in which employers and representatives of other groups identify training needs and develop programs in response to those needs?

16) Does this firm regularly track its expenditures on training? If so, what items are usually included in accounts of training expenditures?

17) Can the firm provide an estimate of training expenditures over the past year? If so, how does this amount compare to annual expenditures over the past five years?

18) Does this firm receive revenues for training programs, materials or services that it provides to other organizations? If so, please describe any training programs, materials, or services provided to other organizations over the past year.

19) Has the firm relied on any special sources for the funding of training undertaken over the past year? If so, please describe the nature of their contributions and their importance to the firm's overall training effort.

20) What resources and services for training activities are usually provided internal and what resources and services are usually provided externally?

21) Has there been any significant change regarding training decisions, the funding of training or the allocation of training resources over the past five years? If so, please describe and provide a brief explanation of these changes.
Training Provision

The following questions focus primarily on the firm's provision of formal training. Formal training is defined as "structured" training that has predefined objectives, a structured format, and a defined curriculum. Some examples include classroom instruction, scheduled and structured on-the-job training (OJT), apprenticeship training, and courses at formal educational or training institutions that are paid for by the employer. Conversely, "informal training" refers to training that lacks predefined objectives, a structured format, or a defined curriculum.

22) What proportion of this firm's total training effort is now devoted to formal training as opposed to informal training?

23) Has the balance between formal and informal training changed over the past five years? If so, please explain how and why.

24) How would you rate this firm's total training effort compared to other firms or establishments in this industry?

25) Has there been any significant change in the firm's total training effort over the past five years? If so, please describe and explain the changes that have occurred.

26) Has this firm provided or sponsored any formal or structured training for its employees over the past year? (If no please skip to Q. 35.)

27) Please provide a brief description of the formal training course(s) or program(s) that the firm provided or sponsored for its employees over the past year.

28) How many employees in different occupational groups received formal or structured training over the past year? How much did they receive?

29) Has this distribution of training provision changed significantly over the past five years? If so, please describe and explain the changes.

30) In what locations did the formal training provided or sponsored by the firm over the past year take place?

31) Has the location of formal training provision changed significantly over the past five years? If so, please describe and explain how the pattern of location has changed.

32) How did the firm evaluate the impacts of the formal training undertaken during the past year?

33) What were the most significant findings from the evaluations of formal training programs provided or sponsored over the past year?
34) Were any of the formal training programs or courses provided or sponsored over the past year linked to innovative activities or innovation projects being undertaken by the firm?

If so, please: a) explain the connections between training and innovation, and b) evaluate the contributions of training to innovation.

**Training Incentives and Disincentives**

35) How successful has formal and informal training been in improving innovative capacity, productivity, quality, skill levels, and organizational commitment?

36) Have there been any other benefits of training for this firm?

37) Have training costs, conflicts with production, employee turnover, lack of suitable resources, or insufficient government assistance posed serious obstacles to training for this firm?

38) Have there been any other obstacles to training for this firm?

39) What are the main problems with regard to training for most firms in this industry? Please provide a brief explanation of the problems identified.

40) What are the most appropriate actions that governments could take to resolve these problems?

That public education and training institutions could take?

That private sector organizations could take?

That individual employers could take?
APPENDIX B - SURVEY

B.C. – PROVINCIAL SURVEY

1996

INNOVATION, SKILLS AND LEARNING
UNIVERSITY OF BRITISH COLUMBIA

CENTRE FOR POLICY STUDIES IN EDUCATION

SMALL AND MEDIUM SIZED ENTERPRISES

IN BRITISH COLUMBIA

A survey looking into innovation and the role skills, learning and training play in the success of an enterprise

SECTION 1: COMPANY/BUSINESS PROFILE

[1] Name of Enterprise:_____________________________________________________

[2] Address:________________________________________________________________

Telephone:_________________ Fax:______________________________________

Contact:_______________________

Telephone:_________________ Email:_____________________________________

[3] In what year was this enterprise established? 19____

[4] Number of employees in 1990 ______ 1995/6 ______

[5] Which of the following best describes your company's main commercial activity?

(check one) This company is involved in:

a) telecommunications equipment

b) computers and related services

c) secondary wood products

d) offices of engineers

Which of the following describes the ownership of this company? 

(check one) Type of ownership:

a) limited company  
b) partnership  
c) public company  
d) single proprietor

Is this enterprise a part of a group of companies? No Yes If yes, 

Is this company: (check one)

1) a parent company  
2) a subsidiary  
3) other (please specify) ____________________________

In the past five years has this company adopted any of the following business strategies? 

(1991/6) Business Strategies:

Yes No

1) strategic partnerships (equity based consortia or joint ventures) 

2) strategic alliances (resource, research or marketing networks) 

a) formal agreements  

b) ad hoc agreements

Is this company a member of a professional and/or sector organization? No Yes If yes, 

Is this membership used to access any of the following services: 

(rank order, using 1 to represent the most frequently used services) 

1) educational programming/training  

2) accessing information and marketing sources  

3) policy related activities (industry/sector trade issues, regulatory trends and standards)
[11a] Does this firm exchange information with other companies it deals with? No Yes

If yes, [b] Are these companies typically:

(rank order, using 1 to indicate the most common exchange relationship)

1) suppliers
2) customers
3) business partners
4) other (please specify)

[c] Would you categorise this exchange of information as adhoc(occasional) or systematic(regular)?

(check either/or for each of 1-4)

(occasional) OR (regular)
1) suppliers
2) customers
3) business partners
4) other (please specify)

[12a] Would you describe your organisational structure as: 1) hierarchical OR b) flat?

[b] How many levels of management/supervision does this company have? ______ levels

[13] Please attach an organizational chart (place at the end of survey)

[14] Where are your major markets located? (rank the top three markets)

(rank) Geographic Areas:

a) British Columbia   b) Canada (outside B.C.)
c) U.S.A.   d) Mexico
e) Europe   f) Japan
g) Australasia   h) S.E. Asia
i) Other (please specify)
[15a] Is your company using elements of ISO and planning to complete certification? 
   No   Yes

[b] Is your enterprise ISO accredited? No   Yes

[c] Do you feel ISO too expensive/time consuming for average small/medium firms? 
   No   Yes

[d] Do you feel pressured to conform to ISO standards by government/competition? 
   No   Yes

[e] Is your enterprise using elements of ISO but has no plans to formally enrol? 
   No   Yes

[16a] Has your company taken advantage of tax credits? No   Yes   If yes

[b] How many years has this strategy been used (total years) _____

[17a] Have you received any other research grants/funds besides tax credits? No   Yes   If yes

[b] Which organizations or agencies provided these funds/grants?

   (check) Organizations/agencies:
   1) IRAP   4) Western Diversification Fund
   2) Science Co   5) Other - Government source
   3) PEMDI   6) Other - Private source

SECTION 2: INNOVATION

[18a] Is this firm developing new and established products/processes simultaneously? No   Yes

[b] How does your company test products or processes? (check as many as appropriate)

Products/processes are tested using:

   a) prototyping (in-house)   e) field trials (in-house)
   b) prototyping (client sites)   f) field trials (client sites)
   c) beta testing (client sites)   g) other (please specify) __________
   d) simulations (in-house)
[19] Does product/process development take place according to a definite plan, schedule or pace?  
(check one) Development is often:

a) systematic - orderly/step by step
b) serendipitous - happening upon fortunate discoveries / information etc by chance
c) systematic and subject to regular review/upgrades
d) other (please specify) _______________________________

[20] Rank the following marketing strategies in order of their importance to your business

(rank) Marketing Strategies

a) new markets for existing technology
b) improving market share
c) creating markets for new and emerging products/processes/technologies

[21] Which external sources of information do you find most useful in development work?

(rank according to importance - 1 represents the most important source of information)

(rank) Sources of Information

a) academic conferences e) professional and sector seminars
b) internet f) trade shows and related activities
c) universities/Govt. labs. g) customer feedback
d) publications h) other (please specify) ______________________

[22] Does innovation typically originate from any one group or person within the company?

(check one) An innovative idea normally comes from:

a) an individual (employees)
b) from departments
c) project teams
d) senior management (owners/principals)
e) mixture of the above
SECTION 3: SKILLS, LEARNING AND TRAINING

[23a] Is training an integral part of your firm's business plan? No Yes

[b] Does this firm have a training budget? No Yes

[24] Are training expenditures formally tracked? No Yes

[25] Does the enterprise formally evaluate the outcomes of training? No Yes

[26] Who provides the majority of training undertaken by employees?

(check one) Training Providers:

a) company employees (in-house)  c) professional/private organizations

b) public institutions

[27] What formal qualifications do your employees have?

(check the number of employees in each category)

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>Management</th>
<th>R&amp;D/Profess.</th>
<th>Sales/Marketing</th>
<th>Technical</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) no high school graduation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) high school graduation/equivalent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) post-graduate degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) other qualifications (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[28] What type of work experience does your company typically look for when hiring?

(rank order, using 1 as the most desired experience)

(rank) This enterprise looks for people with experience that is:

1) job specific  4) industry relevant
2) generic and varied  5) field based
3) project based  6) other (please specify)
[29] Which non-vocational skills and/or personality traits have been incorporated into hiring practices? (rank order, using 1 as the most desired skill/trait)

(rank) When hiring this firm looks for:

a) adaptability
b) a positive attitude
c) a motivated person
d) a self-starter (see over page for remaining categories)
e) team players/people skills
f) leadership qualities
g) other (please specify)

[30] Has your firm experienced an increased demand for business/trade skills over the past five years? (rank in order, using 1 to indicate the most significant increase)

(rank) This company now has more job opportunities for individuals with:

a) generic computer skills/expertise
b) trade skills
c) interpersonal skills
d) management skills
e) industry specific computer skills/expertise
d) other (please specify)

[31] Does this company have a particular way of organizing work?

(check one) Employees are typically assigned to work:

a) within departments
b) in teams/project groups
c) independently (under the supervision of a mentor)
d) on a production line
e) other (please specify)
[32] Has the focus of work (activities) within your company altered over the past five years? (rank according to importance in 1990 and now - 1 represents main focus of work activities)

<table>
<thead>
<tr>
<th>Activities</th>
<th>Focus in 1990</th>
<th>Focus in 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) software development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) end product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) type/delivery of product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) total solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) R&amp;D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[33] Who provides the training within your company? (main trainer - rank order 1)

(rank) Training is normally provided by:

a) in-house (employer initiated)

b) contracted services (external)

c) use of self-directed studies

d) other (please specify) _____________________________

[34] How successful has training been in improving the following aspects of your enterprise?

(rank - 1 represents most successful area of improvement. Training has improved:

a) innovative capacity       d) employee Skill Levels

b) productivity              e) organizational knowledge

c) quality                   f) employee satisfaction

[35] What kind of factors have posed serious obstacles to training over the past five years?

(rank) Serious training obstacles have included:

a) training costs             e) shortage of trainers

b) employee turnover          f) production/work conflicts

c) short versus long-term needs  g) suitable courses

d) employee skill levels      h) other (please specify) _____________________________
Where do training requests normally originate from?

(check one) Training requests tend to come directly from:

a) employees (excluding management)   c) senior management
b) dept/production team heads         d) other (please specify)

Who is responsible for approving training requests in your company?

(check one) Training requests are normally approved by:

a) dept./team heads
b) senior management
c) joint decision between dept./team heads and senior management
d) other (please specify)

Does your enterprise make use of any particular learning strategies?

(check as many as appropriate)

(check) Information is shared and disseminated by:

a) sharing conference papers
b) attending lunch and learn sessions
c) brainstorming opportunities
d) informal mentoring situations
e) retreats and other social activities
f) other (please specify)

REMINDER: Time to include your organizational chart
Is there anything else you would like to add?

Please feel free to ATTACH any additional information relating to either the survey questions or general topics of innovation, learning and training at this point. If you are providing additional information in support of survey responses please include the question number. In the case of general information it would be useful to specify which of the three sections your addition(s) relate to: the company/business profile, innovation, or skills, learning and training.

Many thanks

Hans Schuetze
Leif Hommen
Rosemary Taylor
Amanda Best
October 31st. 1996

ADDITIONAL INFORMATION
APPENDIX C - CASE STUDY PROFILES

1996/7

INNOVATION, SKILLS AND LEARNING
### C1: A software developer offering third party contracting

<table>
<thead>
<tr>
<th>Activity:</th>
<th>Develop cross platform software components for clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded:</td>
<td>Purchased five years ago as a shell company</td>
</tr>
<tr>
<td>Ownership:</td>
<td>Partnership – three senior and five junior partners</td>
</tr>
<tr>
<td>Organizational Form:</td>
<td>Flat or organic</td>
</tr>
<tr>
<td>Revenues:</td>
<td>1996 - $3.62 million</td>
</tr>
<tr>
<td>Personnel:</td>
<td>1990 - 3 1996 - 42</td>
</tr>
<tr>
<td>Growth Pattern:</td>
<td>Dramatic and sustained growth</td>
</tr>
<tr>
<td>Hiring/Employment Practice:</td>
<td>Mainly new graduates/prefers co-op students/motivated, disciplined</td>
</tr>
<tr>
<td>Qualification of Workforce:</td>
<td>Clients</td>
</tr>
<tr>
<td>Innovation driven by:</td>
<td>Mostly under 35, first degrees,</td>
</tr>
<tr>
<td>Clients:</td>
<td>Major software suite developers in North America</td>
</tr>
<tr>
<td>Market: Types/ Locations</td>
<td>&quot;Niche market&quot; - primarily within the U.S.</td>
</tr>
</tbody>
</table>

### C-2: A software company developing in-house products

<table>
<thead>
<tr>
<th>Activity:</th>
<th>Develop Geographic Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded:</td>
<td>1981 – subject to mergers and buyouts until 1993</td>
</tr>
<tr>
<td>Ownership:</td>
<td>Privately owned - one owner with other computer interests</td>
</tr>
<tr>
<td>Organizational Form:</td>
<td>Flat</td>
</tr>
<tr>
<td>Revenues:</td>
<td>1996 - $2.5 million</td>
</tr>
<tr>
<td>Personnel:</td>
<td>1996 – 26</td>
</tr>
<tr>
<td>Growth Pattern:</td>
<td>Expanding after difficulties in early 1990's</td>
</tr>
<tr>
<td>Hiring/Employment Practice:</td>
<td>Mainly new graduates - computer science/geography - team players</td>
</tr>
<tr>
<td>Qualifications of Workforce:</td>
<td>First and graduate degrees</td>
</tr>
<tr>
<td>Innovation driven by:</td>
<td>Clients and market place</td>
</tr>
<tr>
<td>Clients:</td>
<td>Includes forestry/natural resource companies</td>
</tr>
<tr>
<td>Market: Types/ Locations</td>
<td>&quot;Niche market&quot; – international (60%) and Canada (40%)</td>
</tr>
</tbody>
</table>
### C-3: A software developer - embedded systems

<table>
<thead>
<tr>
<th>Activity:</th>
<th>Builds and sells dispatch systems to taxi and courier services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded:</td>
<td>1988 - spin-off from large international concern</td>
</tr>
<tr>
<td>Ownership:</td>
<td>Independent – owner purchased, sold and re-purchased in '92 for 1$</td>
</tr>
<tr>
<td>Organizational Form:</td>
<td>Flat</td>
</tr>
<tr>
<td>Revenues:</td>
<td>1996 - $4.6 million</td>
</tr>
<tr>
<td>Personnel:</td>
<td>1996 – 44</td>
</tr>
<tr>
<td>Growth pattern:</td>
<td>Dramatic growth</td>
</tr>
<tr>
<td>Hiring/Employment Practice:</td>
<td>Hires co-op students - also from other companies in field</td>
</tr>
<tr>
<td>Qualifications of Workforce:</td>
<td>Young, well educated [37 first degrees, 12 M.Sc., 2Ph.D.]</td>
</tr>
<tr>
<td>Innovation driven by:</td>
<td>Market place /clients</td>
</tr>
<tr>
<td>Clients:</td>
<td>Large taxi/courier services in urban areas - little competition</td>
</tr>
<tr>
<td>Market: Types/Locations</td>
<td>&quot;Niche market&quot; – international - emphasis on the United States</td>
</tr>
</tbody>
</table>

### C-4: A software company developing embedded systems

<table>
<thead>
<tr>
<th>Activity:</th>
<th>Develop credit /debit card transaction processing systems/hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded:</td>
<td>1990</td>
</tr>
<tr>
<td>Ownership:</td>
<td>Public company – Board of 6 directors[3 internal/majority holdings]</td>
</tr>
<tr>
<td>Organizational Form:</td>
<td>Flat</td>
</tr>
<tr>
<td>Revenues:</td>
<td>$1.5 million</td>
</tr>
<tr>
<td>Personnel:</td>
<td>1996 – 11</td>
</tr>
<tr>
<td>Growth Pattern:</td>
<td>Expanding</td>
</tr>
<tr>
<td>Hiring/Employment practice:</td>
<td>Hires both full and part-time employees, emphasis on team player</td>
</tr>
<tr>
<td>Qualifications of Workforce:</td>
<td>B.A., B.Sc. and Ph.D - engineering, computer science, marketing</td>
</tr>
<tr>
<td>Innovation driven by:</td>
<td>Market place/clients</td>
</tr>
<tr>
<td>Clients:</td>
<td>Parking companies, merchants, shopping malls, airlines, resorts</td>
</tr>
<tr>
<td>Market: Types/Locations</td>
<td>&quot;Niche market&quot; – Canada, U.S. and internationally</td>
</tr>
</tbody>
</table>
APPENDIX D – FRAMEWORK FOR ANALYSIS
## INTELLECTUAL CAPITAL – FRAMEWORK FOR ANALYSIS

<table>
<thead>
<tr>
<th>Activity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded:</td>
</tr>
<tr>
<td>Ownership:</td>
</tr>
<tr>
<td>Organizational Form:</td>
</tr>
<tr>
<td>Revenues:</td>
</tr>
<tr>
<td>Personnel:</td>
</tr>
<tr>
<td>Growth Pattern:</td>
</tr>
<tr>
<td>Hiring/Employment Practice:</td>
</tr>
<tr>
<td>Qualification of Workforce:</td>
</tr>
<tr>
<td>Innovation driven by:</td>
</tr>
<tr>
<td>Clients:</td>
</tr>
<tr>
<td>Market: Types/ Location</td>
</tr>
</tbody>
</table>

### Business Context

1. Hiring practices
   - The type of knowledge, skills and experience in demand
   - Strategies and factors influencing the final hiring decision

2. Training and professional development
   - Formal policies, statements/ procedures – budgets, tracking/ evaluation
   - The organization and forms

3. Knowledge management
   - Formal policies, statements and procedures
   - Organization and forums – creation, access and transfer of knowledge

---

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**INTELLECTUAL CAPITAL – FRAMEWORK FOR ANALYSIS**

<table>
<thead>
<tr>
<th>Structural Capital</th>
<th>1. Organizational capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Investment in the knowledge infrastructure</td>
</tr>
<tr>
<td></td>
<td>• Structures/ forms of knowledge systems and tools</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structural Capital</th>
<th>2. Innovation capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Protection of knowledge and creative talents</td>
</tr>
<tr>
<td></td>
<td>• Structures/ forms of protection and encouragement – creation of knowledge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structural Capital</th>
<th>3. Process capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Monitoring the efficiency/ productivity levels of knowledge systems</td>
</tr>
<tr>
<td></td>
<td>• Structures and tools – systems and methodologies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Capital</th>
<th>1. Business relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Nature of knowledge relationships</td>
</tr>
<tr>
<td></td>
<td>• Approaches and forms of knowledge relationships</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Capital</th>
<th>2. Innovation, learning and knowledge transfer –</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Influence innovation, learning and knowledge transfer</td>
</tr>
<tr>
<td></td>
<td>• Encouraging customers to participate in the development/ use of new knowledge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Capital</th>
<th>3. Developing support services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Influence on learning and knowledge</td>
</tr>
<tr>
<td></td>
<td>• Types of knowledge and learning situations</td>
</tr>
</tbody>
</table>