INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

**ProQuest Information and Learning
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
800-521-0600**

UMI[®]

INFORMATION TECHNOLOGY USAGE IN CANADIAN SMALL BUSINESSES

by ANGEL TSE. B. Comm.

A thesis submitted to
the Faculty of Graduate Studies
in partial fulfillment of
the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

Carleton University
Ottawa, Ontario
October 02, 2001

© copyright
2001, Angel Tse

**National Library
of Canada**

**Acquisitions and
Bibliographic Services**

**395 Wellington Street
Ottawa ON K1A 0N4
Canada**

**Bibliothèque nationale
du Canada**

**Acquisitions et
services bibliographiques**

**395, rue Wellington
Ottawa ON K1A 0N4
Canada**

Your file Votre référence

Our file Notre référence

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-66867-3

Canada

**The undersigned recommend to the Faculty of Graduate Studies
and Research acceptance of the thesis**

INFORMATION TECHNOLOGY USAGE IN CANADIAN SMALL BUSINESSES

**Submitted by Angel Tse, B. Comm.
in partial fulfillment of the requirements for the
degree of Master of Business Administration**

Thesis Supervisor

Director, Sprott School of Business

**Sprott School of Business
Carleton University**

October 2, 2001

ABSTRACT

This thesis discusses the findings of a detailed study of the trends in the use of information technology (IT) in small businesses. This thesis makes use of the data collected from Dr. Duxbury and Dr. Higgins's study on human resources issues in small business. The population examined included 93 owners and 815 employees representing small firms located across Canada.

Two-third of the companies in the sample are using computers regularly at work. The data suggest that Canadian small businesses were highly reliance on computers and the level of IT sophistication is high. The data indicated that Canadian small businesses use a variety of applications. Finally the results also suggest that certain characteristics of the companies and the respondents are associated with the use of and reliance on computers, the sophistication level of the use, and the application used.

Findings of this research are important for small businesses mangers and vendors of IT as they increase the knowledge of computer usage in Canadian small businesses.

ACKNOWLEDGEMENTS

This research could not have been conducted without the support of many people. First of all, I would like to express my profound gratitude to my thesis supervisor Dr. Linda Duxbury, for her constant guidance, encouragement and patience. Without her feedback and support this research could not have been completed.

Thanks are extended to my thesis committee, Dr. David Cray, Dr. Alex Ramirez, and Dr. Wojtek Michalowski, for their thoughtful comments and guidance throughout this research; and to all my friends for their support during my more stressful moments.

And finally, thanks to my parent for being so supportive throughout and for all their encouragement, inspiration and moral support.

Table of Content

1. INTRODUCTION	1
2. LITERATURE REVIEW.....	5
2.1. DEFINITION AND CHARACTERISTICS OF SMALL BUSINESSES	5
2.1.1. <i>Definition.....</i>	5
2.1.2. <i>Characteristics</i>	8
2.2. SMALL BUSINESS AND INFORMATION TECHNOLOGY	8
2.2.1. <i>IT Usage and Firm Size</i>	9
2.2.2. <i>IT Usage and User Characteristic.....</i>	11
2.2.3. <i>Use of IT by Small Businesses</i>	12
2.2.3.1. <i>Adoption of Computers by Small Businesses</i>	12
2.2.3.2. <i>IT Application Usage in Small Businesses</i>	13
2.2.3.3. <i>Communication Application Usage in Small Businesses.....</i>	14
2.2.4. <i>Future of IT Usage in Small Businesses.....</i>	15
2.3. FACTORS INHIBITING SMALL BUSINESS'S DECISION TO ADOPT IT	16
2.3.1. <i>No Specialists</i>	17
2.3.2. <i>Owners' Lack of Confidence in Computer Vendors.....</i>	18
2.3.3. <i>Financial Constraints</i>	18
2.3.4. <i>Time Constraints</i>	19
2.3.5. <i>User Resistance</i>	19
2.3.6. <i>Lack of Acceptable Software.....</i>	20
2.3.7. <i>Other Inhibitors.....</i>	20
2.4. IT SOPHISTICATION AND FIRM SIZE	21
2.4.1. <i>Definition of IT Sophistication.....</i>	21
2.4.2. <i>Measuring IT Sophistication.....</i>	22
2.4.3. <i>Small Business's IT Sophistication.....</i>	23
2.4.4. <i>Information Technology: Impact of Sector on Use</i>	25
2.5. BENEFITS OF IT FOR SMALL BUSINESSES	26
2.6. CRITIQUE OF THE LITERATURE	27
3. RESEARCH OBJECTIVE	29
3.1. IT/COMPUTER USAGE IN CANADIAN SMALL BUSINESSES	29
3.2. USERS CHARACTERISTIC AND IT USAGE	30
3.3. BUSINESS FACTORS AND IT USAGE	31
3.4. OPERATIONAL DEFINITIONS	31
4. RESEARCH METHODOLOGY	35
4.1. IDENTIFICATION AND SELECTION OF SAMPLE.....	35
4.2. SURVEY INSTRUMENTS.....	36
4.2.1. <i>Owner Survey.....</i>	36
4.2.2. <i>Employee Survey.....</i>	40
4.3. STATISTICAL ANALYSIS.....	42

5. RESEARCH FINDINGS	45
5.1. SAMPLE CHARACTERISTICS	45
5.1.1. <i>Characteristics of Survey Respondents</i>	45
5.1.2. <i>Characteristics of Companies in the Sample</i>	48
5.1.3. <i>Attitudes Towards Technology/Computer</i>	51
5.1.4. <i>Between Group Comparisons</i>	53
5.1.4.1. The Owner Data	54
5.1.4.2. The Employee Data	58
5.2. INFORMATION SYSTEMS USAGE IN CANADIAN SMALL BUSINESS	62
5.2.1. <i>Reliance on Computer</i>	63
5.2.2. <i>Small Businesses Reliance on Computer: Comparison Between Groups</i>	65
5.2.2.1. Effect of Owner Characteristics on the Use of Computers	66
5.2.2.2. Effect of Employees' Characteristics on the Use of Computers	68
5.2.2.3. Effect of Owner Characteristics on Reliance on Computers	70
5.2.2.4. Effect of Employee Characteristics on Reliance on Computer	71
5.2.3. <i>Penetration of Computer Application Into Small Businesses</i>	72
5.2.4. <i>Employee Characteristics Affecting the Use of Computer Applications</i>	74
5.2.5. <i>Computer Sophistication Level</i>	78
5.2.5.1. Application Sophistication	79
5.2.5.2. Communication Sophistication	82
6. CONCLUSION	86
6.1. LIMITATIONS	95
6.2. BENEFITS OF THE STUDY	97
7. REFERENCE	99

List of Tables

Table 1 - Construction of Kagan et al. (1990) Sophistication Score	23
Table 2 - Analysis of Data	44
Table 3 - Characteristics of Sampled Owners	46
Table 4 - Characteristics of Sampled Employees	47
Table 5 - Characteristics of Sampled Companies.....	50
Table 6 - Sampled Owners' Attitudes Toward Technology	51
Table 7 - Sampled Employees' Attitudes Towards New Technology	52
Table 8 - Correlation Coefficients: Owner Survey	54
Table 9 – Companies Growth and Gross Annual Sales	54
Table 10 - Company's Size and Gross Annual Sales.....	55
Table 11 - Sampled Owner Distribution.....	56
Table 12 - Correlation Coefficients: Employee Survey	58
Table 13 - Employee's Job Type and Education Level.....	58
Table 14 - Employee's Age and Education.....	59
Table 15 – Employees' Gender and Job Type.....	60
Table 16 - Sampled Employees Distribution.....	61
Table 17 - Characteristic of Computer Usage	64
Table 18 - Computer Use by Sampled Owner: Comparison Between Groups	66
Table 19 - Computer Use by Sampled Employees: Comparison Between Groups	69
Table 20 - Reliance on Computer by Sampled Owner: Comparisons Between Groups	71
Table 21 - Reliance on Computer by Sampled Employee: Comparisons Between Groups	72
Table 22 - Computer Applications Sampled Small Businesses Are Currently Using.....	73
Table 23 - How Is the Use of IT Applications Associated With Various Employees' Characteristics?	75
Table 24- Computer/Information System Sophistication Level	79
Table 25 - Application Sophistication: Comparison Between Groups.....	81
Table 26 - Communication Sophistication: Comparison Between Groups.....	83

List of Appendices

APPENDIX I – OWNER QUESTIONNAIRE.....	107
APPENDIX II – EMPLOYEE QUESTIONNAIRE.....	126
APPENDIX III – CHI-SQUARE TEST OF RELIANCE ON COMPUTER V.S. MODERATING VARIABLE	146
A3.1 – OWNERS’ COMPUTER USE V.S. COMPANY GROWTH	147
A3.2 – OWNERS’ COMPUTER USE V.S. OWNER’S CONFIDENT TOWARD THEIR ABILITY IN IMPLEMENTING TECHNOLOGY	147
A3.3 – EMPLOYEES’ COMPUTER USE V.S. JOB TYPE	148
A3.4 – EMPLOYEES’ COMPUTER USE V.S. COMPANY SIZE	148
A3.5 – EMPLOYEES’ COMPUTER USE V.S. INDUSTRY SECTOR.....	149
A3.6 – EMPLOYEES’ COMPUTER USE V.S COMPANY GROWTH.....	149
APPENDIX IV – CHI-SQUARE TEST OF COMPUTER APPLICATIONS USES V.S. MODERATING VARIABLE	150
A4.1 – WORD PROCESSING APPLICATION V.S. JOB TYPE	151
A4.2 – SPREADSHEET APPLICATION V.S. JOB TYPE	151
A4.3 – CAD/CAM APPLICATION V.S. JOB TYPE.....	152
A4.4 – INTERNET V.S. JOB TYPE.....	152
A4.5 – EMAIL V.S. JOB TYPE	153
A4.6 – INTERNET V.S. OPEN TO TECHNOLOGY.....	153
A4.7 – EMAIL V.S. OPEN TO TECHNOLOGY	154
A4.8 – WORD PROCESSING APPLICATION V.S. INDUSTRY SECTOR	154
A4.9 – DATABASE APPLICATION V.S. INDUSTRY SECTOR.....	155
A4.10 – CAD/CAM APPLICATION V.S. INDUSTRY SECTOR	155
A4.11 – INTERNET V.S. INDUSTRY SECTOR	156
A4.12 – EMAIL V.S. INDUSTRY SECTOR	156
A4.13 – WORD PROCESSING APPLICATION V.S. COMPANY SIZE	157
A4.14 – CAD/CAM APPLICATION V.S. COMPANY SIZE	157
A4.15 – INTERNET V.S. COMPANY SIZE	158
A4.16 – EMAIL V.S. COMPANY SIZE.....	158
A4.17 – CAD/CAM APPLICATION V.S. COMPANY GROWTH.....	159
A4.18 – INTERNET V.S. COMPANY GROWTH.....	159
APPENDIX V – CHI-SQUARE TEST OF APPLICATION SOPHISTICATION V.S. MODERATING VARIABLE	160
A5.1 – APPLICATION SOPHISTICATION V.S. JOB TYPE.....	161
A5.2 – APPLICATION SOPHISTICATION V.S. INDUSTRY SECTOR.....	161

APPENDIX VI – CHI-SQUARE TEST OF COMMUNICATION SOPHISTICATION V.S. MODERATING VARIABLE	162
A6.1 – COMMUNICATION SOPHISTICATION V.S. JOB TYPE.....	163
A6.2 – COMMUNICATION SOPHISTICATION V.S. OPEN TO TECHNOLOGY.....	163
A6.3 – COMMUNICATION SOPHISTICATION V.S. COMPANY SIZE	164
A6.4 – COMMUNICATION SOPHISTICATION V.S. INDUSTRY SECTOR.....	164
A6.5 – COMMUNICATION SOPHISTICATION V.S. COMPANY GROWTH.....	165

1. Introduction

The adoption of information technology (IT) is advancing at an amazing rate and it seems as if technology is changing society almost on a daily basis. Nowadays, IT ranging from mainframes to personal computers, and from word processing applications to sophisticated manufacturing systems has made considerable inroads into medium and large organizations (Doukidis et al. 1994). Large organizations have invested billions of dollars in IT budgets to just remain competitive in their respective industries. A majority of large organizations now rely on IT for their day-to-day operations since computer technology can provide solutions to many business problems (Shah et al. 1998). The increased importance of IT to organizations is reflected in the fact that the adoption and use of IT has received a great deal of attention in the information systems literature (Mahmood and Mann 1993; Szanja and Scamell 1993).

Most of this research has, however, focused on large organizations (i.e. those employing more than 500 people). IT implementation and usage in the small business sector have not yet gained such attention. A number of factors suggest that the research findings based on MIS environments in large firms cannot be generalized to small firms (DeLone 1981; DeLone 1988; Baldwin et al 1999) including: (1) previous research suggesting that there is a relationship between organizational size and computer success characteristics (Baldwin 1987; DeLone 1988), (2) the fact that the nature of operations, and the organizational environment of small businesses is different than in large organizations (Welsh and White 1981; Baldwin 1987; Baldwin et al 1999), and (3) the

finding that small businesses often suffer from resource poverty, which requires some very different management approaches (Welsh and White 1981; Baldwin et al 1999).

Although big business organizations make a lot of claims to being central to our economy, the fact is that small businesses create most of the new jobs (Carroll and Broadhead 1998). Thus, small businesses are a significant sector of the economy. There is no reason to believe that IT related issues apply any less to small businesses than to these large multinational companies. In fact, studies (Doukidis et al. 1994; Masten et al. 1995) have documented the significant positive impact that IT can provide for small businesses. The declining costs of computer technology (hardware and software) and the advent of simple and easy to use computer systems, languages, and development tools are influencing more small businesses to use computers (Farhoomand and Hryeyk 1985; Coolsy et al. 1987). This trend can be seen by considering the following. In 1985, it was estimated that 25% of small firms were using computers. By 1990, this estimate has increased to 67.5% (Business Week 1994). This growth would suggest that it is critical to determine in which ways small businesses are similar to large companies and which ways they differ with respect to their use of IT.

Although there are some studies on small business information technology issues, they mainly focus on identifying factors contributing to IT success (Raymond 1985; DeLone 1988), to IT implementation (Cragg and King 1993; Igbaria et al. 1997), IT attitudes and concerns (Nickell and Seado 1986); (Ray et al. 1994), and user satisfaction (Montazemi 1988; Palvia 1996; Palvia and Palvia 1999). Relatively little is known

about the use of computer technology in the small business sector. Since small firms have distinctive and unique computing needs compared with the large one (Cragg and King 1993), there is a need to investigate the use of computer technologies in small firms.

This research aims to increase the knowledge of IT usage in the small businesses environment. It will examine the following questions:

1. What is the level of reliance on computers in Canadian small businesses?
2. What is the level of penetration of various computer applications in Canadian small businesses?
3. What is the level of application sophistication in Canadian small businesses?
4. What is the level of communication sophistication in Canadian small businesses?
5. Does education, gender or age of the small business owner affect the level of IT usage in small businesses?
6. Does education, gender, job type or age of the employee affect the level of IT usage in small businesses?
7. How does the attitude of the owner and the employees toward technology affect the usage of IT within the businesses?

8. Does sector, firm size, gross sales, or company growth influence the usage of IT in small businesses?

To answer the above questions, the researcher made use of data collected by Dr. Linda Duxbury and Dr. Christopher Higgins' as part of the study on human resource practises in small businesses. The study was conducted between 1997 to 1999 and made use of both qualitative and quantitative methods. The use of this secondary data limits the analysis that can be performed in this research to the questions included in their study. We also need to use the same definition of small businesses employed by Duxbury and Higgins.

This thesis is further decomposed into 5 additional sections. Section 2 provides a review of the small business literature with an emphasis on the IT literature. In section 3 the research objective of this study and the research questions to be addressed are given. The research methodology to be used in this study is outlined in section 4. Results of this research are presented and discussed in section 5. The conclusions, relevance and limitations of the study are given in the final section.

2. Literature Review

The literature review consists of five main sections. The first section provides a definition of “small” business and outlines their unique characteristics. The second section discusses management information systems (MIS) implementation and IT usage in small businesses. Section three outlines the factors inhibiting the acquisition of IT in small businesses. Section four provides a definition of IT sophistication and discusses its relationship with firm size. This is followed by a discussion of the benefits to small businesses of implementing information technology. The section ends with a discussion of the limitations of the current literature in this area.

2.1. Definition and Characteristics of Small Businesses

2.1.1. Definition

The literature is divided on how to define a “small” business. It has even been suggested that defining a small business has to be arbitrary because different standards are adopted for different purposes such as small business administration (SBA) loans, government grants, etc (Weinstein 1994).

Some studies in this area use annual sales figures of less than \$10 million (Weinstein 1994) as the marker of a small business. This definition however, is flawed by the fact that private companies are often reluctant to disclose their annual revenues (Montazemi 1988). Other researchers define “small” based on the number of employees in the firm. This definition is problematic in that those who determine “small” based on the number

of employees have chosen a variety of different thresholds. For example, while some chose less than 50 employees (Cragg and King 1993), other chose 100 employees (Doukidis et al. 1994), 200 employees (Kagan et al. 1990; Harrison et al. 1997), or 300 employees (DeLone 1988). Others combine both the annual sales figures and number of employees to determine company size. Again the problem is that different researchers have chosen different thresholds. For example, according to the Small Business Administration (SBA) in the United State, firms that had gross annual sales not exceeding \$5 million and numbers of employees not exceeding 250 are defined as a small business (Kagan et al 1990; Palvia 1996). The Association of Small and Medium Enterprises (ASME) in Singapore use a different criterion for defining a small business. According to them, a small business is one that satisfies at least two of the following criteria:

- The number of employees in the business should not exceed 100;
- The business's fixed assets should not exceed US \$7.2 million; and
- The business's annual sales should not exceed US \$9 million (Soh et al 1992).

Within the Canadian government, there are also different definitions of "small businesses". The Small Business Loans Administration of Industry Canada define "small business" as a business carried on or about to be carried on in Canada for gain or profit with an estimated gross annual revenue (*a*) not exceeding \$5 million or any prescribed lesser amount for the fiscal year of the business during which a loan is

approved by a lender in respect of the business; or (b) in the case of a business about to be carried on, not expected at the time a loan is approved by a lender in respect of the business to exceed \$5 million or any prescribed lesser amount for its first fiscal year that is of not less than fifty-two weeks duration (Canada Small Business Financing Act, 1998) .

Statistics Canada tailors the definition of “small businesses” to suit the needs of each report being produced. In the Small Business Profiles Series, for example, small businesses are defined as those having annual revenue between \$30,000 and \$5,000,000. On the other hand, Baldwin (1997) in his report on the importance of research and development for innovation in small and large Canadian manufacturing firms defines small firms as those companies that have less than 99 employees. This is different than how he defined small business in his other report entitled *Innovation: The Key to Success in Small Firms* (Baldwin 1995): where he considered a business as small if it had fewer than 500 employees and less than \$100 million of assets.

The confusion on what is meant by small business is compounded by the fact that different provincial governments use different definition. In Ontario, businesses with less than 100 employees are referred to as small or medium enterprises (SMEs) while in British Columbia, businesses with less than 50 employees are referred to as small or medium enterprises (Ontario Government 1995; British Columbia Government 1999).

2.1.2. Characteristics

Although the literature does not agree on the definition of a small business, it does agree on the characteristics of a small business. Small businesses tend to have simple and highly centralized structures (Welsh and White 1981; Lees and Lees 1987), and suffer from severe constraints on their financial resources (Welsh and White 1981; Lees and Lees 1987; Montazemi 1988; Gable 1991; Baldwin et al 1999), a lack of trained personnel resources (Welsh and White 1981; Lees and Lees 1987; Montazemi 1988; Gable 1991), and a short-range management perspective imposed by a volatile competitive environment (Welsh and White 1981; Lees and Lees 1987; Gable 1991; Levy and Powell 1998). Organizational theories and practices that are applicable to a large business may not fit a small business, as a small business is “not a little big business” (Welsh and White 1981).

2.2. Small Business and Information Technology

In a review of this kind, one must first operationalize terms such as information and information technology. The term information is used broadly in the research literature to include the spectrum from data to information to knowledge (Glynn and Koenig 1995). On the other hand, IT is used broadly to refer to electronic information technology, particularly as it supports access, retrieval, and storage of pertinent business information (Glynn and Koenig 1995).

2.2.1. IT Usage and Firm Size

While the use of information technology is steadily on the rise in small businesses, it still pales in comparison with IT applications in large- and medium-sized organizations (Palvia 1996; Morissette and Drolet 1998; Baldwin et al 1999). According to Morissette and Drolet (1998), while one in two Canadian workers use computers on the job, larger firms with more than 500 employees have substantially higher adoption rates (65.7%) than do small firms with 20-99 employees (41.6%) and micro firms with 1-19 employees (32.7%). These data would suggest that it is an oversimplification to assume that small businesses implement IT in a process equivalent to large businesses (Coolsy et al. 1987; Baldwin et al 1999). The differences between the computing environments of small and large organizations may, therefore, make it necessary to develop an IT implementation model specifically for small businesses (Igbaria et al. 1997).

In general, larger organizations have more opportunities to use IT, a more developed infrastructure, and a more developed strategic planning function. They are also more informed about new technologies (Baldwin et al 1999; Winston and Dologite 1999). According to Ein-Dor and Segev (1978), firm size had a direct positive relationship to management information system (MIS) success; larger firms tending to be more organizationally mature, to have more resources to allocate for MIS, and to function on a longer organizational time frame. These findings were supported by the research done by Delone (1981) on the use of information systems in small manufacturing firms.

Delone (1981) found that firm size affects how a business manages its internal computing resources.

Malone (1985) points out that small businesses are, however, uniquely advantaged in some aspects of IT implementation. In particular he notes that small business typically have a more flexible environment, are capable of a more rapid response and have a more open personal working environment. All of these can be expected to increase the probability of a successful IT implementation. Raymond (1985) reported that while firm size (in term of number of employees) was not significantly associated with either user satisfaction or system utilization, it was significantly related to many of the key organizational characteristics of computer usage such as EDP experience, development of IT, application used, and the rank of the executive responsible for MIS. Raymond also stated that larger firms tend to have greater EDP experience, develop a greater proportion of their applications internally, implement a greater number of administrative applications, and have a MIS function supervised by lower level management.

Finally, several recent studies on the use of IT in small and large organizations (Montazemi 1988; Burrows 1994; Glynn and Koenig 1995; Iacovou et al. 1995; Thong et al. 1996; Baldwin et al 1999) have reported that there are some major differences between small and large firms with respect to their use of IT. These differences include the fact that small firms:

- Tend to use computers more as tools and less as a communications medium;

- Have distinct advantages over large firms in adopting new technology because their lack of a large bureaucracy allows greater operational flexibility when coupled with the availability of advanced technologies;
- Have fewer resources available to implement IT solutions; and
- Suffer from a lack of technical information.

The findings of these studies reinforce Igbaria et al's (1997) argument that academics need an IT implementation and usage model that is unique to small businesses. The data collected in this research should help in the creation of such a model.

2.2.2. IT Usage and User Characteristic

User characteristics (especially owner characteristics) have a particularly significant influence on small businesses compared to larger companies, as the owner is most likely the one who make decisions about IT investment and the one who may be actually the primary user (Palvia and Palvia , 1999). Although differences between men and women in terms of computer use has seldom been examined in small businesses, Palvia and Palvia (1999) reported in their study that gender was significantly related to IT satisfaction. Daly and Kitchell (1995) argue that the age and educational background of the small firm's production manager and corporate innovativeness (i.e. technology adoption) are negatively correlated and curvilinear. A study done by Morissette and Drolet (1998) found the opposite. They observed that professionals and highly educated workers are the most likely to use computers, and young workers tend to use computers

less often than their older counterparts. Various researchers (Nickell and Seado 1986; Ray et al 1994; Winston and Dologite 1999) further suggest small business owner with positive attitudes toward IT often have a thorough knowledge about IT and will commit to an IT implementation.

2.2.3. Use of IT by Small Businesses

2.2.3.1. Adoption of Computers by Small Businesses

The literature suggests that the adoption of computer within small business sector over the last decade has grown rapidly. Nickell and Seado (1986) determined that 68% of the 121 small businesses studied had computers. They also found that small businesses used computers for basic functions such as accounting, budgeting, inventory control, and word-processing (i.e. functions which are frequently done by lower level personnel in large organizations). A decade later, El-Louadi (1996) reported that 76% of the 72 Quebec small businesses in this sample used microcomputers at work. Darbyshire et al (1998) noted that 76% of their sample of Australian small businesses used a desktop computer at work. Shah et al (1998) further determined that out of the 151 small businesses that responded to his survey, 134 (88.7%) indicated that they had a computer at their work place. Berry and Wood (1998) reported that 89.1 percent of the 92 US small businesses they surveyed used a computer in their business.

While the results of these studies suggest that the use of computer in the small business sector is growing rapidly over the past decade, Morissette and Drolet (1998) findings

(32.7% of “micro” and 41.6% of “small” businesses in this sample used a computer) suggest that Canadian small business sector have still not caught up with their US counterpart with respect to its adoption.

2.2.3.2. IT Application Usage in Small Businesses

A number of studies shed some light on the types of software applications used by small businesses. In terms of application software usage, Malone (1985) found that small business managers rated accounting and inventory control functions as the most important computer applications, and inventory control as the most problematic. Researchers (Farhoomand and Hryeyk 1985; Nickell and Seado 1986; Lincoln and Warberg 1987) further indicated that small business firms tend to use computer to support accounting applications, for word processing activities, and for spreadsheet analysis.

Two third of the small businesses in Farhoomand and Hryeyk (1985) sample used packaged programs; 50% used customized programs; and 30% used self-programmed software. They also reported that software needs and applications were the most important criteria for acquiring a computer system. In a study of 70 small firms by Grise et al (1989), the most widely used computer application was accounting (for more than 70%), followed by word processing (49%). El-Louadi (1996) further confirmed that after a decade, word processing (82%) and accounting (82%) and inventory management systems (61%) are still the most popular applications in his sample of Quebec small businesses.

The results of these studies suggest that while larger businesses make use of IT to gain strategic or competitive advantage, to increase organizational information-processing capacity and operational productivity (El-Louadi 1996; Baldwin 1997; Eden et al 1997), small businesses tend to use IT to support the operational routine and daily aspects of their business. Taken together the data reviewed in these sections suggest that the adoption of computers by small businesses in the past decade has been extensive but the adoption of IT applications has been limited to word processing, accounting and inventory management systems.

2.2.3.3. Communication Application Usage in Small Businesses

The Internet market is undergoing an explosive growth. At the end of 1995, commerce conducted on the Internet amounted to over US\$159 million in sales (Fariselli et al 1999). According to a recent study done by Statistics Canada (2001), more businesses had Internet connections in 2000 than in 1999 (63% compared with 53%). The proportion of employees with direct access to the Internet advanced to 39% in 2000 from 28% a year earlier. Thus communication technologies are becoming an integral part of the day-to-day operation of many companies (Statistics Canada 2000).

Although many reports in newspapers and journals discuss the various uses of the Internet by businesses, most of the results are based on large businesses. The Internet provides a means for levelling the playing fields between small and large businesses. Small businesses who use the Internet can offer their products to a wider market and

can research information readily (Darbyshire et al 1998). Thus an in depth study on the use of communication applications in the small business sector is needed.

Among the few studies on Internet usage in small business, Berry and Wood (1998) reported that less than half (47.8%) of the small firms in their sample had access to the World Wide Web (WWW) and few understood how to use it. Simon and Wilkes (1998) also reported that less than half of the small firms in their survey had Internet access. Over 40% of the respondents in their sample reported that they had no employees with Internet access.

While the Internet usage is still relative low in the US small business sector, Darbyshire et al (1998) found that usage of the Internet and electronic mail is increasing rapidly in Australian small businesses. Ninety eight percent of the Australian small businesses in their sample were aware of electronic mail and 25% used it for both internal and external communications. Darbyshire et al (1998) did, however, report that communication applications (such as email) were ranked as less important to the business than of other IT applications (such as word processing). The above studies indicate that while the adoption of Internet is increasing, small businesses have still not caught up with their larger counterpart with respect to its adoption.

2.2.4. Future of IT Usage in Small Businesses

In terms of the future of IT usage, Raymond (1985) suggested that small businesses are actually capable of implementing applications other than the basic transactional

application; applications which address a greater range of problems with decision aids such as interactive modeling and planning systems. He went on to suggest that the small business manager is capable of using the MIS in an autonomous and interactive fashion with user-friendly tools such as database query languages and graphics output systems. Recent literatures (Kagan et al 1990; Cragg and Zinatelli 1995; Berry and Wood 1998) suggest that Raymond might have been correct. These studies have reported that more advanced technologies such as database, CAD/CAM, end-user computing and EDI have been gradually used by small businesses. Small businesses do appear to be capable of implementing more sophisticated applications.

2.3. Factors Inhibiting Small Business's Decision to Adopt IT

Despite the many programs and efforts of governments and information providers, both public and private, there is a body of literature that indicates small-business adoption of IT is still relatively slow. Since small business access to and use of information is both driven and constrained by the rate of adoption, this literature is deemed pertinent to this study.

Despite the needs for information technology, small businesses frequently have problems in adopting and using information technology. According to Malone (1985), the reasons for the reservation in information systems usage in small business can be attributed to a lack of the resources needed for MIS implementation, a lack of formalized systems and the short management time frame characteristic of the small business environment. Malone also found, however, that small businesses who used IT

improved the quality of decision making as well as enhanced the firm's effectiveness in competing with larger firms.

These inhibitors were also identified in a study done by Cragg and King (1993).

According to Cragg and King (1993), there are four factors that discourage the use of information systems in small business: lack of IT knowledge, limited financial resources, lack of computer expertise, and lack of managerial time. In addition, problems such as user resistance and lack of acceptable software also inhibit the use of information technology in small firms. Details on each of these barriers are given below.

2.3.1. No Specialists

Studies (DeLone 1988; Gable 1991) found that small businesses tend to employ generalists rather than specialists. As such, they typically do not have the appropriate technical skills available in-house to maintain computer information systems. To implement IT they have to either train existing staff or purchase those skills in the marketplace.

Thong et al. (1996) further indicated that due to their small size, limited number of senior positions, and fewer alternative career paths, small businesses who do want to get internal IT expertise have a more difficult time attracting and retaining skilled information systems staff. This means that small businesses that wish to adopt IT are more likely to be dependent upon external expertise.

Finally, the owner-manager's salary in a small business represents a much larger fraction of revenues than in a large company; often such a large fraction that little is left over to pay additional managers or to reward investors (Welsh and White, 1981). This fact often means that small businesses often cannot afford professional IT specialists.

2.3.2. Owners' Lack of Confidence in Computer Vendors

Even if they can afford such a service, a study done by Baker (1987) indicated that most of the owners of small businesses don't have enough confidence in computer vendors to provide ongoing service and support after implementation. As such, they are reluctant to adopt IT.

2.3.3. Financial Constraints

Although the technology is much cheaper than before, it still represents a considerable investment for small business. According to Welsh and White (1981) small businesses are operating in a highly competitive environment. External forces tend to have a lot of impact on small business. As such, they have to watch their cash flow carefully and tend to have a short-range management perspective. Therefore, it is often difficult to justify the cost of information systems. With the evolution in IT applications and external pressure from competitor and trading partner, this may be less relevant today with respect to basic software and hardware.

Even if the cost of the information system was justified, Thong et al (1996) stated that with a lack of financial resources, small businesses tend to choose the lowest cost

information systems. Such systems are often inadequate for their purposes. Small business owners also underestimate the amount of time and effort required for information systems implementation, which increases the risk of implementation failure.

2.3.4. Time Constraints

Information systems were often acquired by the business manager / owner to save time as well as to reduce costs (Doukidis et al 1994). The introduction of information systems, which may lead to dramatic changes in the business's fundamental activities, requires an awareness and basic knowledge within the management function. The time required for the installation and implementation of the systems alone absorbs a considerable amount of senior manager's time. According to Doukidis et al. (1994), many owners of small businesses appear to be too busy in day-to-day operations to invest time in such a project. As the involvement of the top management in the implementation project is a critical factor for the success of the information systems project (Thong et al. 1996), there is a significant risk that the introduction of the information system will be unsuccessful and the cost of such a failure may be fatal for the small business lacking adequate financial and productive cushioning.

2.3.5. User Resistance

Past research (Cheney 1983; Malone 1985; Coolsy et al. 1987) has shown that the primary problem with the implementation of information systems in small businesses is

user resistance to the computer systems. The resistance problem is often caused by perceived job threats due to the lack of understanding and confidence in the new technology. The main reason for the misunderstanding is because small businesses do not have the resources to provide formal training for the user of the computers and the training provided by the vendor is often considered inadequate (Gable 1991). Without proper training, the small business users often find the systems to be difficult to use and are consequently dissatisfied with their introduction.

2.3.6. Lack of Acceptable Software

Small firms also often suffer from difficulties in acquiring acceptable software. (i.e. software package is often either inflexible or incorrect). Packaged systems may be seen as ideal systems for many small firms as they are affordable and require low IT expertise (Cragg and King 1993). As such, these software packages are often inflexible and small businesses have to accept the software limitations and adapt their organization to meet the systems requirement (Cragg and King 1993). This problem may be caused by the limited budget for software or by the dependence on outside programmers (DeLone 1981; Cragg and King 1993).

2.3.7. Other Inhibitors

There are other reasons for the manager of a small business to avoid information technology. According to Doukidis, Smithson, and Kyberekas (1994), there are still

some owners of small businesses who believe that information technology is unnecessary to them and also feel that technology is changing too fast.

2.4. IT Sophistication and Firm Size

Another way to look at IT implementation by small business is to examine what has been implemented and assess its “sophistication” (i.e. complexity). Such an examination should allow us to better understand the stage of evolution of IT in small business (i.e. the more sophisticated the use, the more “evolved” the usage). Lehman (1985) proposed that the relationship of organizational size to IT sophistication is important for intra-organizational use in capacity planning. As such it is worth including in this study.

2.4.1. Definition of IT Sophistication

A number of researchers (Ein-Dor and Segev 1982; Raymond 1985; Lehman 1985; Kagan et al 1990) have developed instruments to help measure the concept of IT sophistication in many dimensions, including diffusion (Ein-Dor and Segev 1982), types of applications (Raymond 1985; Lehman 1985), and hardware and software capability (Raymond 1985; Kagan et al 1990). However, there exists no consensus in this area with respect to either the characteristics of IT sophistication or how it should be defined.

Raymond and Pare (1992) provided a definition of IT sophistication which is useful to this thesis. They defined IT sophistication as a construct that refers to the nature,

complexity, and interdependence of IT usage and management in an organization. According to Raymond and Pare (1992), this construct is multi-dimensional and includes aspects related to (1) technological support (i.e. the number or diversity of information technologies used, referring to various domains such as computer graphics, CAD/CAM, and local and wide area networking), (2) information content (i.e. the nature of its application portfolio, including both transactional and administrative applications), (3) functional support (i.e. the structural aspects of the IT function and the IT implementation process), and (4) management practices (i.e. the mechanism employed to plan, control and evaluate present and future applications). Thus, both IT usage and management play important roles in determining IT sophistication.

2.4.2. Measuring IT Sophistication

As there is no recognized definition of IT sophistication, the way researcher have measured sophistication is also different. Some researchers (Ein-Dor and Segev 1982; Cheney 1983; Lehman 1985) used the number of micro/workstations along with the level of hardware decentralization in the organization to indicate IT sophistication of the organization. Others choose to assess IT sophistication by the diversity of programming languages (i.e. 3rd and 4th generation) and other development tools (e.g. graphics) used (Lehman 1985), the types of applications used (Raymond 1985; Kagan et al. 1990), and the hardware and software capability (Raymond 1985). Finally, some researchers (Kagan et al. 1990; Ghorab 1997) consult other computer professionals and use their opinion to assess the level of IT sophistication in the sample organization.

Kagan et al. (1990), for example, developed a sophistication score based on the result of a systems professional survey rating of computing applications done by 30 computer professionals from the computer industry and academia. The construction of his sophistication score is represented in Table 1. Similarly, Ghorab (1997) formed a panel of seven industry experts and university academics to subjectively assess level of technological sophistication of every organization that they surveyed.

Table 1 - Construction of Kagan et al. (1990) Sophistication Score

A. Results of Systems Professional Survey (m = 30) ranging of computing application (1-10 continuous scale).	
APPLICATION	MEAN SCORE
Word Processing	1.65
Payroll	3.26
Spread Sheet	4.03
Ordering	4.03
Pricing	4.08
Employee Scheduling	4.19
Inventory Control	4.64
Branch Inventories	4.75
Data Applications	5.16
Telecommunications	5.74
Database	6.13
Decision Models	7.87
B. Sophisticated Score Construction: Score = 1.65 (Word Processing) + 3.26 (Payroll) + 4.03 (Spread Sheet) + 4.03 (Ordering) + 4.08 (Pricing) + 4.19 (Employee Scheduling) + 4.64 (Inventory Control) + 4.75 (Branch Inventories) + 5.16 (Data Applications) + 5.74 (Telecommunications) + 6.13 (Database) + 7.87 (Decision Models) Where each application is a binary variable (1 for Yes, 0 for No)	

2.4.3. Small Business's IT Sophistication

Early studies (Cheney 1983; Farhoomand and Hryeyk 1985; Malone 1985; Baker 1987) of small firm computing showed IT sophistication to be relatively low, with a typical

firm having only one microcomputer and accounting systems being the most common application area.

The development of the PC has, however, meant that software and hardware (especially user friendly and affordable accounting software packages) are becoming more available. Kagan et al's (1990) study indicated that despite the fact that small business had used more sophisticated software, the primary use of computers in such firms is still very much at the transactional processing level. This suggests that the evolution of IT usage in small business from transactional processing to MIS to decision support systems to expert systems to, ultimately, artificial intelligence is processing at a slower rate than that found in larger firms.

Recent studies (Cragg and Zinateli 1995; Raymond and Pare 1992) reported that in many small firms, computing efforts have become more sophisticated and have evolved, particularly in terms of hardware, software, and end-user computing. While small businesses have still not caught up with their larger counterpart with respect to the level of IT sophistication, small businesses have started to use more diverse technologies in the support function other than accounting and the IT used in small businesses is becoming more sophisticated. Recently, newer technologies such as end-user computing and electronic data interchange have been adopted by some small businesses (Berry and Wood 1998).

In addition to the cost reduction of the PC, many other factors have influenced the evolution and sophistication of IT in small firms. According to Cragg and King (1993),

important motivators included enthusiasm from the owner, as well as perceived benefits to individuals and the organization. Important inhibitors to growth include low IT knowledge and skills, lack of managerial time, lack of funds, and technical complexity.

2.4.4. Information Technology: Impact of Sector on Use

Many researchers (Malone 1985; Nickell and Seado 1986) grouped small business firms into one category for study, with the assumption that these firms have similar computing applications needs (Kagan et al. 1990). According to the study done by Kagan et al. (1990), small business firms, like their larger counterparts, have distinctive and unique computing needs and applications based on their industry classification

Kagan et al. (1990) found that the nature of the business had a great impact on software sophistication levels. According to their study, the wholesale sector has the most sophisticated software routines, followed by retailing, manufacturing, and professional sector firms. The service sector appears to be the least sophisticated group with respect to IT adoption. In the classification of software use, the authors found that the professional group was the smallest user of payroll, inventory and ordering applications. On the other hand, the manufacturing sector was the predominant user of payroll applications while wholesalers used inventory packages and ordering applications extensively.

2.5. Benefits of IT for Small Businesses

Studies (DeLone 1981; Doukidis et al. 1994; Thong et al. 1996) have already suggested a number of ways that information technology can benefit small business. It has, for example, been proven that the use of information systems improves the quality of decision making as well as enhancing the firm's effectiveness in competing with larger firms. Other benefits often mentioned by small firms include: accuracy in customer statements, faster billing of customers, timelier reporting, and more management information (DeLone 1981). According to Thong, Yap, and Raman (1996), information technology can help small businesses develop their markets, increase sales turnover, raise profitability, secure their positions within their industries, and gain a competitive edge.

In addition, Doukidis, Smithson, and Kybereas (1994) identified the following benefits information technology offers small businesses:

- Improved productivity and performance within the enterprise;
- Greater internal control of operations;
- The possibility of new ways of managing activities;
- Improved management perception and penetration of business environments;
- The possibility of new organizational forms (e.g. networked organizations);
- The delivery of a valued and high quality package of product and service;

- The extension of available markets; and
- The redefinition of existing businesses or the spawning of whole new businesses.

2.6. Critique of the Literature

The above review of the literature presents interesting information on IT related issues in small businesses. The research that was reviewed shows that IT adoption rate is steadily increasing in small businesses and a wide range of IT applications have been used by some in this sector. The conclusions that can be drawn from the available literature are however limited by a number of factors. First, as noted above, there has been little research on IT in small businesses. Second, it is important to note that most of the research that is available is dated as it was done in the 1980s and early 1990s. Given the rate of evolution in the IT area a lot can have changed in this time.

Third, the lack of a united definition of what a small business is has meant that, researchers have grouped businesses of difference gross annual sales and sizes into one category for study. In the majority of studies on small business, the companies included in the sample are in many ways similar to medium and large size organization (i.e. up to 500 employees and gross annual sales over \$5,000,000). Research on ‘truly’ small businesses (i.e. under 100 employees) is rare in the current literature and little is known about the relationship between relative company sizes on IT usage. Similarly, the relationship between industry sector and IT usage has not been explored in depth within

small businesses. Researchers have instead tended to focus on a particular industry (especially manufacturing) rather than a variety of sectors for study.

The literature on the sophistication of applications used in small businesses is further limited by the fact that researchers used different definition and measuring instruments. Thus, there is no comparable data with respect to IT sophistication in small businesses. Furthermore, as most of the research available is dated, the use of newer communication technology such as Internet in small business is rarely discussed.

While the above literature review would suggest that IT adoption and usage is becoming a more common practice in the small business sector, it should be noted that virtually all of the data that is currently available in this area was collected in the U.S. There is little Canadian empirical study in this area. The Canadian research that is available is limited to a specific region / province, (i.e. Daly and Kitchell's (1995) study on the Ontario machinery sector and El-Louadi's (1996) study on the Quebec manufacturing sector). Baldwin et al (1998) found that there are differences across regions with respect to technology adoption; this would limit the generalizability of much of the previous work in the area. As such, study on IT adoption in national small businesses is needed. What is the reality of IT adoption and usage in Canadian small businesses? What business factor and user characteristic are associate with the use of IT in Canadian small businesses? This thesis aims to answer these questions by empirically examining the topic of IT adoption and usage in Canadian small businesses.

3. Research Objective

The main purpose of this thesis is to better understand the use of IT in Canadian small businesses. Specifically, this thesis looks into (1) IT / computer usage in Canadian small businesses, (2) the relationships between user characteristics and IT usage, and (3) the relationship between business factors and IT usage. Details on each objective are given below.

3.1. IT/Computer Usage in Canadian Small Businesses

The first research objective is to examine IT /computer usage in Canadian small businesses. Specifically, this thesis examines the reliance of small businesses on computers, the level of penetration of various computer applications, and the IT sophistication level within the firm. Reliance is defined in this thesis as the number of hours of computer use per day of the respondent in the small business. The level of penetration is operationalized in this thesis as the type of computer applications being used in the small business. IT sophistication is defined in section 3.4.

Specifically, this thesis seeks answers to the following questions:

1. What is the level of reliance on computers in Canadian small businesses?
2. What is the level of penetration of IT in Canadian small businesses?
3. What is the level of application sophistication in Canadian small businesses?

4. What is the level of communication sophistication in Canadian small businesses?

3.2. Users Characteristic and IT Usage

The second research objective is to examine the relationship between various characteristics of the user and the level of IT usage in small business. These questions were motivated by the various studies (Nickell and Seado 1986; Ray et al 1994; Daly and Kitchell 1995; Morissette and Drolet 1998; Palvia and Palvia 1999; Winston and Dologite 1999) done on users characteristics and IT adoption. As the literature indicated that user characteristics (especially owner characteristics) have a particularly significant influence on small businesses compared to larger companies, as the owner is most likely the one who make decisions about IT investment and the one who may be actually the primary user (Palvia and Palvia , 1999). Four user-related factors (i.e. age, gender, education, and job type) have been examined in this thesis.

We included the following questions to answer the above objective:

5. Does the education, gender or age of the owner affect the level of IT usage in small business?
6. Does the education, gender, job type or age of the employee of the company affect the level of IT usage in small business?
7. How does the attitude of the owner and employee toward technology affect the usage of IT within the business?

3.3. Business Factors and IT Usage

The third research objective is to examine the relationship between various characteristics of the small business (sector, size group, gross sales, and company growth) and the level of IT usage in small business. This question was motivated by work done by DeLone (1981) who stated that as a firm increased in size, it would demand more sophisticated software. Kagan et al. (1990) provide further support for this examination by indicating that as firm size increases the level of software sophistication also increases. Palvia et al. (1994) further indicate that there is a positive relationship between profitability and computer utilization in small businesses. Finally, several studies (Kagan et al 1990; Palvia and Palvia 1999) have also found that there is variation on the level of penetration of IT in different sectors of small business.

We included the following question to clarify the above issues:

8. Does sector, size group, gross sales, or company growth influence the usage of IT in small businesses?

3.4. Operational Definitions

For the purposes of this study, the following operational definitions are used:

- Small business: This thesis adopts the same definition of small business used by Duxbury and Higgins. According to them, a small business is a company with less than 100 employees.

- **Level of reliance on computers:** The number of hours of computer usage per day as reported by the owner and employee in the owner and employee surveys.
- **Level of penetration of IT:** The kinds of computer applications being used as reported by the owner and employee in the owner and employee surveys.
- **IT sophistication:** This study adopts the definition of IT sophistication used by Raymond and Pare (1992). IT sophistication is a construct that refers to the nature, complexity, and interdependence of IT usage and management in an organization. According to Raymond and Pare (1992), this construct is multi-dimensional and includes aspects related to technological support, information content, functional support, and management practices. The measure of IT sophistication used in this study was limited by the questions used in Duxbury and Higgins survey. Consequently, this thesis focuses only on the technological aspect of IT sophistication (i.e. the diversity of IT applications used by small business). In order to understand the evolution of IT sophistication of small business (i.e. be able to compare the data to previous research), this thesis divided IT sophistication into two components: application sophistication and communication sophistication. As the majority of the existing research on IT sophistication was done in the 80s and early 90s, when communication technology such as Internet and email was not yet popular, there is no comparable data with respect to the use of communication applications. Details on each are given below.

- **Application sophistication level:** As noted in the literature review, researchers have adopted different measurement of IT sophistication to suit their study. This thesis is limited in how it defines application sophistication by the questions used in Duxbury and Higgins survey. For the purpose of this thesis, application sophistication was measured as follow: (1) companies that use only word processing applications are deemed to have “low” sophistication, (2) companies that use spreadsheets and/or database application are defined to have medium sophistication, and (3) companies that use CAD/CAM and/or custom applications are defined to have “high” application sophistication. This breakdown is consistent with the literature in the area. In general, researchers (Cheney 1983; Farhoomand and Hryeyk 1985; Malone 1985; Baker 1987; Kagan et al 1990) have considered word processing to be an application with low sophistication relative to spreadsheet and database applications. CAD/CAM applications, on the other hand have been widely considered to be examples of advanced or sophisticated technology (Baldwin et al 1999).
- **Communication sophistication level:** There are no empirical studies on communication sophistication in small business. Furthermore, no measure of this construct could be found. This thesis measures communication sophistication level by the type and diversity of communication application used as reported by the owner and employee in the owner and employee surveys. For the purpose of this thesis, communication sophistication was measured as

follow: (1) as previous research reports that Internet related communication media is rarely used in small business, companies that do not have access to INTERNET at work are deemed to have “low” communication sophistication, (2) companies that use email are defined to have “medium” communication sophistication, and (3) companies that use the INTERNET are defined to have “high” communication sophistication.

- Level of IT usage: This consisted of the level of reliance, the level of penetration, the level of application sophistication, and the level of communication sophistication.

4. Research Methodology

This section reviews the methodology that was used for this thesis. Section 4.1 *Identification and Selection of Sample*, describes how the sample for this thesis was selected; section 4.2 *Survey Instruments*, describes the questions from Dr. Linda Duxbury and Dr. Christopher Higgins' research that was used for this thesis; Section 4.3 *Statistical Analysis*, outlines the statistical methods used in the analysis of the data.

4.1. Identification and Selection of Sample

The sample examined in this thesis was obtained from Dr. Linda Duxbury and Dr. Christopher Higgins' study on small business which was carried out between 1997 to 1999. In their study, "small business" was operationalized as a company with less than 100 employees; a definition which is consistent with one used by Statistics Canada. The sample, which includes small businesses of various industry sectors from across Canada, was collected as follows.

Letters were sent out to a random sample of 5000 small businesses whose data were included in Dunn & Bradstreet's database. Of these, 103 companies actually participated in the research. Two sets of survey data were collected: 103 surveys from the owners of these businesses and 1129 surveys from employees who worked for these companies. For the purpose of this research, 10 owners were removed from the owner analysis group because either they had more than 100 employees in total (i.e. the business they owned was not small), or because the survey was not completed. Three

hundred and fourteen employees were removed from the employee sample because their industry sector and firm size could not be identified. This sample used in the thesis, therefore, consisted of 93 owners and 815 employees.

4.2. Survey Instruments

As the major focus of Duxbury and Higgins' study was human resource practices in small business, only parts of the survey were applicable to this thesis (i.e. those which ask about the use of computer hardware and software, and background information on the business, the employer, and the employee). The following section describes the specific questions that were used from the questionnaires and offers an explanation as to why each questions is included. The actual questionnaire is given in Appendices I and II.

4.2.1. Owner Survey

The owner survey contained 51 questions and was divided into the following five sections: Section I – *Information on Your Business*; Section II – *Human Resource Practices in Your Business*; Section III – *Your Job*; Section IV *Physical and Mental Health*; and Section V – *Information About You*. The following questions from the survey were used in the analysis:

- Question 2 “*How would you classify your company with respect to Industry Sector membership?*” was used to categorize the small business into 10 different industry sectors including: manufacturing, high technology, retail,

accommodation/food, agricultural, construction, consulting, wholesale, education/ health, and real estate.

- Question 3 *“In total, how many years of business experience do you have in this industry?”* was used to collect information of owner’s business experience (i.e. demographic characteristic of the owner).
- Question 4 *“What was your company’s gross annual revenue or sales for the most fiscal year?”* was used to categorize the small business into 5 different gross annual sales groups including: \$1 to \$249,000, \$250,000 to \$499,000, \$500,000 to \$999,000, \$1,000,000 to \$4,999,999, and over \$5,000,000.
- Question 5 *“Excluding the owners, how many: (a) Full-time employees does your company have? (b) Part-time employees does your company have? (c) Temporary or seasonal employees does your company have?”* was used to determine a company’s firm size (i.e. total number of employees). For this research, we defined the total number of employees in a company as the total number of full time and part time employees (i.e. excluded temporary employees). In terms of size groups, this thesis adopted the classification employed in Duxbury and Higgin’s study. The companies were split into four groups. Companies with 3 to 10 employees were classified as “micro” small business. Companies with 11 to 25 employees were classified as “small” small business, while “medium” small businesses were defined as companies with 26

to 50 employees. Those companies with 51 to 99 employees were classified as “large” small business.

- Question 7 “*Compared to the number of full-time employees your company had two years ago, has the number of full-time employees in your company (a) Increased? (b) Decreased? (c) Stayed the same?*” was used to categorize the small business into 3 different groups with respect to company’s growth including: growing (i.e. increased), shrinking (i.e. decreased), and stable (i.e. stayed the same).
- Question 15 “*Do you have access to the INTERNET?*” was used to determine a company’s communication sophistication. The way Internet was used (i.e. email or Internet) was used to determine the level of the penetration of IT and the communication sophistication level as outlined in the operational definitions.
- Question 16 “*Do you use a computer regularly in your work?*” was used to collect information on a company’s computer usage. The number of hours of computer use was used to determine the level of reliance on computer, while the types of application used was used to determine the level of penetration of IT and the application sophistication level as outlined in the operational definitions.
- Question 27 “*To what extent do you agree or disagree with the following statements: I am open to trying new technology.*” was used to determine the

owner's attitude towards new technology. The data was interpreted as (1) positive (i.e. strongly agree), (2) neutral, and (3) negative (i.e. strongly disagree).

- Question 28 "*How confident do you feel regarding your ability to: Implement technology.*" was used to determine the owner's confidence with respect to implementing technology (i.e. very confident, moderately confident, and not very confident).
- Question 30 "*Which of the following human resources issues would you consider to be important to the future success of your business? Successful implementation of technology.*" was used to determine owner's attitude towards technology. The data was interpreted as (1) positive (i.e. very important), (2) neutral (i.e. moderately important), and (3) negative (i.e. not important).
- Question 41 "*What is your gender?*" was used to categorize the owner as male or female.
- Question 42 "*What is your age?*" was used to categorize the owner into 2 age groups: (1) under 47 and (2) over 47. (i.e. above and below the mean)
- Question 47 "*Please CIRCLE the letter which BEST describes your educational background*" was used to categorize the owner into 6 different educational levels including (1) some high school, (2) high school diploma, (3) some

college/university, (4) college diploma, (5) university degree and, (6) post-graduate degree.

4.2.2. Employee Survey

The employee survey contained 50 questions and was divided into the following seven sections: Section I – *Your Job*; Section II – *Working for a Small Business*; Section III – *Your Manager/The Business Owner*; Section IV – *Productivity*; Section V – *Training and Development*; Section VI – *Physical and Mental Health*; Section VII – *Information About You*. The following questions from the survey were used in the analysis:

- Question 14 “*To what extent do you agree or disagree with the following statement: We are open to trying new technology.*” was used to gather information on employee’s attitude toward technology. The data was interpreted as (1) positive (i.e. strongly agree), (2) neutral, and (3) negative (i.e. strongly disagree).
- Question 32 “*What is your gender?*” was used to categorize the employee as male or female.
- Question 33 “*What is your age?*” was used to categorize the employee into 2 age groups: (1) under 35 and (2) over 35. (i.e. above and below the mean)
- Question 38 “*Please CIRCLE the letter which BEST describes your educational background*” was used to categorize the employee into 6 different educational level including (1) some high school, (2) high school diploma, (3)

some college/university, (4) college diploma, (5) university degree and, (6) post-graduate degree.

- Question 40 “*How long have you worked for the company you are currently with?*” was used to determine an employee’s familiarity with their company. Longer years are interpreted to mean greater familiarity.
- Question 41 “*How long have you had your present job?*” was used to determine an employee’s familiarity with their job. Longer years are interpreted to mean greater familiarity.
- Question 44 “*Do you use a computer regularly in your work?*” was used to collect information on employee’s computer usage. The number of hours of computer use was used to determine the level of reliance on the computer, while the types of applications used was employed to determine the level of penetration of IT, the application sophistication level and, the communication sophistication level as outlined in the operational definitions.
- Question 47 “*Please CIRCLE the letter which BEST fits most of the work you do*” was used to categories the employee into 5 different job groups including (1) managerial/professional, (2) technical, (3) administrative/clerical, (4) retail and, (5) production.

4.3. Statistical Analysis

This section provides an overview of the statistical techniques used in this thesis to analyze the survey data. Table 2 summarizes for each research objective the information gathered to answer the research questions and the statistical techniques used to analyse this information. Detail on each of these items is given below.

To describe the population that answered the survey, frequencies, mean scores and standard deviations were calculated on all demographic data gathered from the surveys. The data were used to divide the sample into subgroups (i.e. firm's industry sector, firm's size, firm's company growth, firm's gross annual sales, age, gender, education background, job type) and to provide information on owner and employee experience (i.e. business experience, experience with company, experience with job).

To answer the first objective of the research, frequencies for each category, mean scores and, standard deviation for each question were calculated on the computer/Internet related data gathered from the surveys.

To answer the last two objectives of this study, demographic variables describing the company, owner and, employee were examined to see if these had an impact on the findings obtained in the first objective. Chi-square (for categorized data) and one-way ANOVA (for continuous variables) techniques were used to answer these objectives. The first step in this analysis involved using the relevant demographic variables to divide the sample into the group of interest. Means and frequencies were then

calculated for each of these groups. Chi-square or one-way ANOVA was then calculated to see if the groups differed in these responses to the questions asked in the first objective.

Table 2 - Analysis of Data

Objective and Question	Data used to answer	Statistical technique used
Description of the population that answered the surveys	Owner survey: Question 2, 3, 4, 5, 7, 41, 42 & 47. Employee survey: Question 32, 33, 38, 40, 41 & 47	Frequencies for each category, mean scores and standard deviations
Objective 1: IT usage in Canadian small businesses		
What is the level of reliance on computers in Canadian small businesses?	Owner survey: Question 16. Employee survey: Question 44	Frequencies for each category, mean scores and standard deviations
What is the level of penetration of IT in Canadian small businesses?	Owner survey: Question 15 & 16. Employee survey: Question 44	Frequencies for each category.
What is the level of application sophistication in Canadian small businesses?	Owner survey: Question 16. Employee survey: Question 44	
What is the level of communication sophistication in Canadian small businesses?	Owner survey: Question 15. Employee survey: Question 44	
Objective 2: Relationship between various characteristics of the user and the level of IT usage in small business		
Does the education, gender or age of the owner affect the level of IT usage in small businesses?	Owner survey: Question 15, 16, 41, 42 & 47	Chi-square (level of penetration, application sophistication level and, communication sophistication level) and one-way ANOVA (for level of reliance)
Does the education, gender, job type or age of the employee of the company affect the level of IT usage in small businesses?	Employee survey: Question 32, 33, 38 & 44	
How does the attitude of the owner and employee toward technologies affect the usage of IT within the businesses?	Owner survey: Question 15, 16, 27, 28 & 30 Employee survey: Question 14 & 44	
Objective 3: Relationship between various characteristics of the small business and the level of IT usage in small business		
Does sector, size group, gross sales, or company growth influence the usage of IT in small businesses?	Owner survey: Question 2, 4, 5, 7, 15 & 16 Employee survey: Question 44	Chi-square (level of penetration, application sophistication level and, communication sophistication level) and one-way ANOVA (for level of reliance)

5. Research Findings

In this section the main findings of the research are presented and discussed. The chapter is outlined as follows: Section 5.1, *Sample Characteristics*, describes the characteristics of the sample that participated in this study (i.e. characteristics of respondents, characteristics of companies, companies' attitudes toward computer technology). Section 5.2, *Information Systems Usage in Canadian Small Businesses*, describes the current level of software penetration, reliance on the computer, application sophistication and communication sophistication within the Canadian small businesses in our sample.

5.1. Sample Characteristics

Demographic data was used to describe the survey respondents and the characteristics of the firms participating in this study. This section is organized as follows:

The survey respondents are described first. This is followed by information on the responding companies. Data on the attitudes of sampled owners and employees toward technology/computers is then presented.

5.1.1. Characteristics of Survey Respondents

The respondents were divided into two groups: company owners and employees. The demographic characteristics of the sample are presented in two ways: as percentages

and as means. The characteristics of the sampled owners are described in Table 3 and the characteristics of the sampled employees are described in Table 4.

Table 3 - Characteristics of Sampled Owners

Gender	Percentage (n = 93)	
Male	75.8%	
Female	24.2%	
Age	Mean	Standard Deviation
	47.92	8.39
	Percentage	
Under 47	51.7%	
Over 47	53.3%	
Educational Background	Percentage	
Some High School	4.5%	
High School diploma	10.2%	
Some College / University	13.6%	
College diploma	19.3%	
University degree	46.6%	
Post-graduate degree	5.7%	
Business Experience	Mean	Standard Deviation
	19.41	9.76

Seventy-six percent of the owners were male and 24.2% female, consistent with the general proportion of the Canadian small business owner, as men account for 70% of all small business owners (Tjepkema and Brunet 2000). The data indicates the majority of the sampled owners were in their late forties (mean age = 47.92, ranging from 30 to 67) and highly educated (i.e. 5.7 % of the owners had a post-graduate degree, while 46.6% had a university degree, and 19.3% had a college diploma). Consistent with their age, the small business owner in the sample had a lot of business experience (i.e. mean years of business experience = 19.4, ranging from 0 to 44 years).

Table 4 - Characteristics of Sampled Employees

Gender	Percentage (n = 815)
Male	49.6%
Female	50.4%
Age	Percentage
Under 35	53.8%
Over 35	46.2%
Mean	35.49
Std. Deviation	10.60
Educational Background	Percentage
Some High School	11.1%
High School Diploma	19.4%
Some College / University	21.8%
College Diploma	21.8%
University Degree	20.3%
Post-graduate Degree	5.6%
Job Type	Percentage
Managerial / Professional	36.8%
Technical	26.2%
Clerical / Administrative	20.5%
Production	9.5%
Retail	6.9%
Time with present company	Percentage
0- 4 years	40.8%
5 and above	59.2%
Time in present job	Percentage
0- 2 years	37.6%
3 and above	62.4%

The employee sample appears to be well distributed with respect to gender, age, education and job type. Respondents were evenly split along gender lines. Consistent with the finding in Lin et al's (1999) study, the data indicates the employees in the sample were younger (i.e. majority of the employees were in their early thirties – mean age = 35.49) than the owners. In general, sampled employees had less formal education than sampled owners: 30% had a high school diploma or less; 21.8% had some college

or university; 21.8% had a college diploma; 20.3% had a university degree; and 5.6% had a post-graduate degree.

The sample is also well distributed with respect to job type, with approximately one third of the respondents working in managerial/professional positions, one quarter in technical jobs and 20% holding clerical/administrative positions. A smaller number of respondents worked in production (10%), and retail (7%) positions. As the employees in the production and retail positions are underrepresented in this sample, it should be noted that findings of this survey might not be generalizable to the Canadian employees working in these positions/sectors.

Finally, the data supported the assumption that in general, respondents might have a sound knowledge of the company they represent as well as how computers are used in their work place. Typically, the employees in the sample had been working for the company they represent for about 5 years, and in their current position for almost 3 years.

5.1.2. Characteristics of Companies in the Sample

The characteristics of the companies represented by the survey respondents are described in Table 5.

The responding companies represented a wide variety of industries. The majority of firms in the sample are in the manufacturing (17%) and consulting (17%) sectors.

Others classified themselves as part of the high technology (13%) sector, retail (12%),

educational/health (9%), accommodation/food and beverage (9%), and “other” (9%) sectors. Examination of the responses indicated that in all cases “other” means natural resources, transportation/communication or financial industry. This distribution suggests that findings of this thesis may be generalizable to consulting and manufacturing sectors. The sample is not large enough to generalize to the high technology, retail, accommodation/food and beverage, education/health/social service, construction, wholesale, agriculture, and real estate sectors, as these sectors are under-represented in the sample.

The responding companies also represented a wide variation in size (i.e. number of employees). The size of the responding organizations varied from the very small (3 employees) to the large (90 employees). Mean organizational size was approximately 26 employees (mean = 24.91, SD = 22.47). From Table 5 it can be seen that 29% of the companies were “micro” organizations, 25.8% were “small”, 20.4% were “medium” and 24.7% were “large” small businesses. This distribution allows us to examine the effect of small business “size” on IT usage.

With respect to company growth, 52.7% of the respondents defined their company as a growing firm with an average increase of approximately 7 employees per year. One third of the firms were stable (i.e. classified their company as staying the same) with respect to size. Only 13.5% of the respondents indicated their organization was decreasing in size, with an average decrease of approximately 8 employees per year.

Table 5 - Characteristics of Sampled Companies

Company with respect to Industry Sector		Percentage	
Consulting		17.2%	
Manufacturing		17.2%	
High Technology		12.9%	
Retail		11.8%	
Accommodation/Food and Beverage		8.6%	
Education/Health/Social Services		8.6%	
Misc. Other		8.6%	
Construction		5.4%	
Wholesale		5.4%	
Agricultural		2.2%	
Real Estate		2.2%	
Company Size		Percentage	
Micro (3 to 10 employees)		29.0%	
Small (11 to 25 employees)		25.8%	
Medium (26 to 50 employees)		20.4%	
Large (51 to 99 employees)		24.7%	
Number of Employees		Means	Std. Deviation
Number of full-time employees		24.91	23.47
Number of part-time employees		6.62	10.48
Number of temporary employees		7.72	27.27
Company Growth (Change in number of full time employees)		Percentage	
Increased		52.7%	
Decreased		13.5%	
Stay the same		33.8%	
Gross Annual Sales		Percentage	
\$1 to \$249,999		1.1%	
\$250,000 to \$499,000		7.6%	
\$500,000 to \$999,000		14.1%	
\$1,000,000 to \$4,999,999		47.8%	
Over \$5,000,000		29.3%	

In terms of the gross annual sales figure, 29.3% of the respondents described the gross annual sales of their companies for the most recent fiscal year as over five million dollars, while half indicated their gross annual sales figures were between one million to five million dollars. Just over 10% (14.1%) reported five hundred thousand to one

million dollars of gross annual revenue. Only 9% of respondents indicated their company's gross annual revenue was less than five hundred thousand dollars. These data indicate that we can extrapolate the findings in this survey to firms that are in a sense "doing well" (i.e. growing, making money). We are not able to extrapolate these findings to firms that are losing money.

5.1.3. Attitudes Towards Technology/Computer

In the owners survey respondents were asked to describe their attitude toward technology/ computers. Their answers are summarized in Table 6.

Table 6 - Sampled Owners' Attitudes Toward Technology

I am open to trying new technology	Percentage
Strongly disagree	2.5%
Neutral	2.5%
Strongly agree	94.9%
Confident toward ability to implement technology	Percentage
Not confident	22.6%
Moderately confident	25.8%
Confident	51.6%
Successful implementation of technology is important to the future success of the company	Percentage
Not important	5.1%
Moderately Important	8.9%
Important	86.1%

The data indicates that in general, small business owners in this sample have positive attitudes toward technology. About 95% of respondents stated that they were open to trying new technology; the remaining 5% indicated that they were either neutral or not open to trying new technology. With regards to their ability to implement new technology, over half of the respondents expressed confidence in their ability to

implement technology, and another quarter were moderately confident. Around 20% stated they were not confident in their ability to implement new technology. The data also indicates that 86.1% believe that successful implementation of new technology is important to the future success of their business. Only 5.1% of respondents indicated successful implementation of new technology is not important with respect to their businesses future success.

To summarize the findings, the majority of owners in this sample were open to trying new technology, confident that they could successfully implement the technology, and see need in adopting new technology. In other words, the owners who responded to this survey present few barriers to the adoption of IT. These findings are consistent with the findings suggested by (Berry and Wood 1998) that most small businesses are somewhat familiar with Information Technology and feel comfortable using it. These findings also suggest that owners who were not confident with respect to technology did not answer the survey. We therefore cannot make conclusions regarding computer use in small businesses where owners have negative attitudes towards technology.

Employees were also asked to describe their company's attitude towards new technology. Details are given in Table 7.

Table 7 - Sampled Employees' Attitudes Towards New Technology

We are open to trying new technology	Percentage
Strongly disagree	13.6%
Neutral	22.6%
Strongly agree	63.8%

The data indicated that over 60% of sampled employees feel their company was open to trying new technology, while 22.6% described their company's attitude as neutral. Only 13.6% found their companies not open to new technology.

Although employees were not as likely to say "open" as owners were in this sample, the majority still felt that their company had favourable perceptions about technology.

Again, these findings indicate a bias in our sample, and limit our ability to generalize our findings to the entire small business population.

5.1.4. Between Group Comparisons

It was necessary to perform two additional types of data analysis before looking at how the characteristics of the firm, the characteristics of the owner, and the characteristics of the employee affected computer use, application use, application sophistication, and communication sophistication. First, correlations were calculated among all the characteristics being considered. This was done to determine if there was multicollinearity in the data. After this analysis was completed we examined the n's of the various sample breakdowns to ensure there were enough respondents in the different groups to perform meaningful statistical analysis. The results of these preliminary analyses are discussed below.

5.1.4.1. The Owner Data

Table 8 - Correlation Coefficients: Owner Survey

	Gross Annual Sales	Company Growth	Company Size	Industry Sector
Gross Annual Sales	1.000	0.259 P = 0.013	0.706 P = 0.000	0.026 P = 0.808
Company Growth		1.000	0.105 P = 0.319	-0.100 P = 0.339
Company Size			1.000	-0.027 P = 0.800
Industry Sector				1.000

Correlation analysis indicated that there are significant positive correlations between (1) gross annual sales and company growth and (2) gross annual sales and company size (see Table 8). Closer examination of the data (see Table 9) indicates that 63% of the sampled firms having gross annual sales over \$5,000,000 were growing, as compared to 36.4% of those with gross annual sales between \$1,000,000 and \$4,999,999, and 46.2% of firms with gross annual sales between \$500,000 and \$999,000. On the other hand, all the sampled firms with gross annual sales less than \$499,000 were either stable or shrinking. These data suggest that growing firms were more profitable than firms that were stable or shrinking.

Table 9 – Companies Growth and Gross Annual Sales

	Increase	Stay the same/ decrease
\$1 to \$499,000	0%	100.0%
\$500,000 to \$999,000	46.2%	53.8%
\$1,000,000 to \$4,999,999	36.4%	63.6%
Over \$5,000,000	63.0%	37.0%
Total	42.4%	57.6%

With respect to size, data (see Table 10) indicated that two-third of the sampled “micro” firms have gross annual sales below \$999,000, compared to 26.9% of those with gross annual sales between \$1,000,000 to \$4,999,999, and 7.7% of those with gross annual sales over \$5,000,000. Three-quarters of the sampled “small” firms have gross annual sales between \$1,000,000 to \$4,999,999, compared to 16.7% of those with gross annual sales below \$999,000, and 8.3% of those with gross annual sales over \$5,000,000. On the other hand, none of the sampled “medium” and “large” firms have gross annual sales below \$999,000, while 73.7% of the sampled “medium” firms have gross annual sales between \$1,000,000 to \$4,999,999, and 26.3% of the sampled “large” firms have gross annual sales over \$5,000,000. Data suggest that larger firms were more profitable than smaller firms.

Table 10 - Company's Size and Gross Annual Sales

	\$1 - \$999,000	\$1,000,000 to \$4,999,999	Over \$5,000,000
Micro	65.4%	26.9%	7.7%
Small	16.7%	75.0%	8.3%
Medium	0%	73.7%	26.3%
Large	0%	21.7%	78.3%
Total	22.8%	47.8%	29.3%

As gross annual sales were highly dependent on company growth and size, this study will not examine the impact of gross annual sales on computer usage.

The sample breakdowns for each characteristic of the owners examined in this research are described in Table 11.

Table 11 - Sampled Owner Distribution

	Groups			
Gender	Male 75.8%		Female 24.2%	
Age	Under 47 51.7%		47 and above 53.3%	
Education	No university 47.7%		University degree or above 52.3%	
Implement technology	Not/ moderately confident 48.4%		Confident 51.6%	
Industry sectors	Consulting 17.2%	Manufacturing 17.2%	High Technology 12.9%	Other 52.7%
Company size	Micro 29%	Small 25.8%	Medium 20.4%	Large 24.7%
Company Growth	Increased 41.9%		Stay the same/ Decreased 58.1%	

Small sample sizes in some cells meant that a number of the between group comparison could not be done as originally conceptualized. The following categories were collapsed so that we could answer research questions 5 to 8:

1. Sampled owners were divided into the following two groups with respect to their age: (1) under 47 and (2) equal to and greater than 47.
2. Sampled owners with no university degree (i.e. with some high school, a high school diploma, some college / university, and a college diploma) were grouped together to form a group labelled “no university”, and those with a university degree were grouped with those with a post-graduate degree to form a group labelled “university degree or above”.
3. Sampled owners that were not confident in their ability to successfully implement new technology were grouped with those that were moderately confident in their

ability to successfully implement new technology to form a group labelled “not/moderately confident”. The responses given by this group were then compared to those given by respondents who were completely confident.

4. With respect to industry sectors, sampled owners in the retail, accommodation/food and beverage, education/health/social service, construction, wholesale, agriculture, real estate, and miscellaneous other sectors were grouped together to form a group labelled “other”. The responses given by the owners in this group were then compared to the responses given by those in the consulting, manufacturing and high tech sectors. While the number of owners in the high tech sector might not be large enough for comparison, it is important to include this sector so that owner and employee data could be compared.
5. Sampled owners of companies that were shrinking were grouped with those that were stable (no change in the number of full time employees) to form a group labelled “Stay the same/ Decreased”. The responses given by the owners of the companies in this group were then compared to the responses given by owners of growing companies.

Finally, this study will not examine the impact of owners’ openness to trying new technology and their attitude towards the need in adopting new technology on computer usage. The small sample size of owners not open to new technology and not seeing the need in adopting new technology did not allow us to look at each group separately in the analysis.

5.1.4.2. The Employee Data

Table 12 - Correlation Coefficients: Employee Survey

	Job Type	Age	Education	Gender
Job type	1.000	-0.079 P = 0.027	-0.223 P = 0.000	0.308 P = 0.000
Age		1.000	-0.123 P = 0.000	-0.069 P = 0.049
Education			1.000	-0.062 P = 0.080
Gender				1.000

Table 13 - Employee's Job Type and Education Level

	Managerial/ professional	Technical/ production	Clerical/ administrative/ retail
High School or less	21.6%	50.2%	28.2%
Some College or College Diploma	33.7%	33.4%	32.8%
Undergraduate or Post- Graduate Degree	60.1%	21.7%	18.2%
Total	37.1%	35.3%	27.6%

Correlation analysis indicated that job type was highly confounded with gender and education. The data indicated there are significant negative correlations between (1) employees' education and job type and (2) employees' education and age (see Table 12). Closer examination of the data (see Table 13) indicates that 60.1% of sampled employees who had a university degree or above were in the managerial/professional positions, compared to 33.7% of those with some college or a college diploma, and 21.6% of those with a high school diploma or less. The data further indicated that 32.8% of the sampled employees that had some college or a college diploma were holding clerical/ administrative/ retail positions, compared to 17.4% of those with a

university degree or above, and 28.2% of those with a high school diploma or less. The data also indicated that 50.2% of the sampled employees that had a high school diploma or less were in technical/production positions, compared to 33.4% of those with some college or college diploma, and 21.7% of those with a university degree or above. It appears from these data that managerial/ professional employees tend to be highly educated with a university degree or above, while the pink-collar (clerical/ administrative/ retail) tend to be slightly less educated with some college or a college diploma, and the technical/ production employees tend to be the least educated with a high school diploma or less.

Table 14 - Employee's Age and Education

	Less than 35	36 and over
High School or less	45.7%	54.3%
Some College or College Diploma	54.3%	45.7%
Undergraduate or Post-Graduate Degree	62.0%	38.0%
Total	53.7%	46.3%

With respect to age (see Table 14), data indicated 62% of sampled employees having a university degree or above were below the age of 35, compared to 54.3% of those with some college or college diploma, and 45.7% of those with a high school diploma or less. These data suggest that younger employees have more years of formal education than their older counterparts.

Table 15 – Employees' Gender and Job Type

	Male	Female
Managerial/professional	60.2%	39.8%
Technical/production	64.9%	35.1%
Clerical/administrative/retail	18.9%	81.1%
Total	50.5%	49.5%

There is also a significant positive correlation between employee gender and job type.

Closer examination of the data (see Table 15) indicated that the majority (81.1%) of clerical/administrative/retail employees in the sample were female, while the majority of technical/production (64.9%) and managerial/professional (60.2%) employees in the sample were male. Data suggest that females tend to work in the clerical/administrative/ retail positions, while males tend to hold technical/ production and managerial/ professional positions. The above data suggests only one of these variables (i.e. job type) should be examined, as one could predict the respondent's gender, education and age from their job type.

The sample breakdowns for each characteristic of the employees examined in this research are described in Table 16.

Table 16 - Sampled Employees Distribution

	Groups			
Job Type	Managerial/ Professional 36.8%		Technical/ Production 35.7%	Clerical/ Administrative/ Retail 27.4%
Open to technology	Strongly disagree/ Neutral 36.2%		Strongly Agree 63.8%	
Industry sectors	Consulting 17.9%	Manufacturing 17.7%	High Tech 13.1%	Other 51.3%
Company Size	Small 25.4%		Large 74.6%	
Company Growth	Increased 50.2%		Stay the same/ Decreased 49.8%	

Similar to the owners' data, the following categories of employees' responses were collapsed so that we could answer research questions 5 to 8:

1. Sampled employees working in clerical/administrative positions were grouped with those holding retail positions to form a group labelled "clerical/ administrative/ retail", and those working in technical positions were grouped with those in production positions to form a group labelled "technical/ production". The response given by employees in these groups were then compared to those given by respondents who work in the managerial/professional positions.
2. Sampled employees who felt their company had negative perceptions about technology were grouped with those who described their company's attitude as neutral to form a group labelled "strongly disagree/neutral". The response given by employees in this group were then compared to those given by respondents who had positive perceptions.

3. Sampled employees in the retail, accommodation/food and beverage, education/health/social service, construction, wholesale, agriculture, real estate, and miscellaneous other sectors were grouped together to form a group labelled “other”. The responses given by employees in this group were then compared to the responses given by those in the consulting, manufacturing and high tech sectors.
4. While the sampled companies were evenly distributed with respect to company size, the majority of the employees answering the survey were working in larger firms (i.e. more than 25 employees). For the purpose of analysis, the sampled employees were divided into the following two groups with respect to company size: (1) small (i.e. 3 – 25 employees) and (2) large (i.e. 26-99 employees).
5. With respect to company growth, sampled employees in companies that were shrinking were grouped with those that were stable (no change in the number of full time employees) to form a group labelled “Stay the same/ Decreased”. The responses given by employees in this group were then compared to the responses given by employees of growing companies.

5.2. Information Systems Usage in Canadian Small Business

The purpose of this section is to address the research questions listed under research objectives. Specifically, this section looks at the current trend of information system/computer usage in small business, including the level of reliance on computer usage, penetration of computer applications, and IT sophistication level. This section

also looks at factors associated with the level of reliance, penetration, application sophistication and communication sophistication on computers such as age, job type, firm size, and industry sectors.

This section is divided into sections corresponding to the research questions. The first part, Section 5.2.1, *Reliance on computer*, presents findings relevant to question 1: “What is the level of reliance on computers in Canadian small businesses?” The second part, Section 5.2.2, *Small businesses reliance on computer – comparison between groups*, relates to Objective 2: User Characteristic and IT usage and Objective 3: Business factors and IT usage. The third part, Section 5.2.3, *Penetration of computer applications*, presents findings that pertain to Question 2: “What is the level of penetration of IT in Canadian small business?” The fourth part, Section 5.2.4, *Firms using these computer applications – comparison between groups*, provides data to answer Objective 2: User Characteristic and IT usage and Objective 3: Business factors and IT usage. This section ends with Section 5.2.5, *Computer Sophistication Level*, which discusses data that has relevance to Question 3: “What is the level of IT sophistication in Canadian small businesses?” and the question posited in Objective 2: User Characteristic and IT usage and Objective 3: Business factors and IT usage.

5.2.1. Reliance on Computer

The characteristics of computer usage in the Canadian small businesses in this sample are described in Table 17.

Table 17 - Characteristic of Computer Usage

Use computer regularly at work	Owner % (n = 93)	Employee % (n= 815)
	67.7%	70.2%
Hours computer use per day	Owner % (n=61)	Employee % (n=572)
Less than 2 hours	33.3%	19.2%
3 – 4	44.4%	17.5%
5 – 6	11.1%	23.4%
Over 7 hours	11.1%	39.9%
Mean (hrs)	3.73	5.31
Std. Deviation	2.50	2.68

The data support the fact that the use of computer technology in Canadian small business has grown rapidly over the past few years. The majority of the survey respondents (67.7% of sampled owners and 70.2% of sampled employees) use a computer regularly at work. This is a higher percent than was reported by Morisette and Drolet (1998) for 1994 (41.6%). It should also be noted that, while this sample would suggest that the use of computer technology in small businesses appears to be on the rise, a significant percentage (32.3% of sampled owners and 29.8% of sampled employees) of the survey respondents still do not use a computer at work. These findings support the idea that computer use in small businesses is lower than in medium and large firms. Further, it is important to note that the use of computer technology in Canadian small businesses (at least as measured in this sample) have not caught up in any significant fashion with the US findings (88.7%, as noted by Shah et al, 1998).

While the majority of survey respondents use a computer regularly at work, the level of reliance on the computer (i.e. hours of computer use per day) varies. The hours of computer use per day varied from virtually no usage (less than 1 hour) to very heavy

usage (over 10 hours). By assuming an 8-hour workday, the data indicated the majority of employees and owners who use computers at work are highly reliant on this technology.

Overall, the data suggested that employees are more reliant on computers than owners. Employees spend an average of 5 hours a day on the computer, while owners spend an average of 3.7 hours a day. These findings are consistent with the finding reported by Doukidis et al (1994) that small business owners appear to be too busy in other day-to-day operations and therefore, the time that they spend on using the computer is limited.

5.2.2. Small Businesses Reliance on Computer: Comparison Between Groups

While identifying the trend of computer usage in Canadian small businesses is very important, it is also important to be able to identify who is using computer technology and who is not. Chi-square tests were calculated to explore the effect size of organization, industry sector, company growth rate, the respondent's background (i.e. age, gender, educational background, job type), and the respondent's attitude toward technology have on whether computers were used regularly at work. One-way ANOVA was used to determine the relationship between and among these variables and reliance on the computer. Complete results of the analysis are presented in Appendix III and discussed in the sections below.

5.2.2.1. Effect of Owner Characteristics on the Use of Computers

Table 18 summarizes the significant results for each group comparison using the owners' survey data. Approximately two out of three owners use a computer regularly at work. While the percentage of sampled owners using computers varies between sectors (ranging from 60% to 81%), sectorial differences in use were not found to be significant. Company growth ($\chi^2 = 8.357$ df = 1 $\alpha = 0.003$) and owner's confidence toward implementing technology ($\chi^2 = 17.7222$ df = 1 $\alpha = 0.000$) were, however, significantly associated with the owner's use of the computer.

Table 18 - Computer Use by Sampled Owner: Comparison Between Groups

Company Growth	% of owners that use computer
Stay the same / decreased	55.6%
Increased	84.6%
Confidence Toward Implement Technology	% of owners that use computer
Not confident/ Moderately Confident	46.7%
Confident	87.5%
Total	67.7%

Although sector was not found to be significantly associated with computer usage, the trend of using computers between sectors was interesting. The data indicates that the percentage of sampled owners that use computers ranges from a high of 81% in the consulting sector to a low of 20% in the construction industry. This finding is consistent with the previous studies (Ein-Dor and Segev 1978; DeLone 1981; Kangan et al 1990) that report industry sector had an impact on computer usage.

The percentage of sampled owners in growing firms that use a computer at work was significantly higher than that of sampled owners in stable/shrinking firms. Almost all owners who indicated their company as growing used a computer at work. By comparison, only 55.6% of sampled owners that indicated their company as stable or shrinking used a computer at work.

The data indicated that owners' confidence in their ability to successfully implement new technology is strongly associated with whether or not they themselves use a computer. Almost all owners who stated confidence to implement new technology used a computer at work. By comparison, only 46.7% of owners that were not/moderately confident in their abilities to implement new technology used a computer regularly at work. This finding is consistent with the literature that owners with negative attitudes avoid investing in technology (Delone 1988) and those with positive attitudes towards IT will commit to an IT implementation (Winston 1998).

While the literature indicates there is a relationship between firm size and computer use, our data does not show a significant association. In summary, the following business factors and owners' characteristics were not found to be associated with owners' computer use: gender, age, education background, firm size, and sectors. This finding suggests that company growth and owner attitude towards technology are the key factors with respect to the adoption of technology.

5.2.2.2. Effect of Employees' Characteristics on the Use of Computers

The percentage of employees who use a computer at work (70%) was slightly higher than the percentage of owners who do (67.7%). The tendency for small business employees to use a computer at work is significantly associated with the employee's job type ($\chi^2 = 71.563$ df = 2 $\alpha = 0.000$), industry sector ($\chi^2 = 97.325$ df = 3 $\alpha = 0.000$), company size ($\chi^2 = 5.006$ df = 1 $\alpha = 0.025$), and company growth rate ($\chi^2 = 6.736$ df = 1 $\alpha = 0.009$). Table 19 summarizes the significant results for each group comparison in the employees' survey.

Employees in managerial/professional (82.2%) and clerical/administrational/retail (81.8%) positions were significantly more likely to use a computer at work. By comparison, only 53.6% of technical/production employees used a computer at work. This finding is consistent with the Morissette and Drolet (1998) study, which indicates professional, managerial and clerical workers are the most likely to use computers.

This is not surprising given the type of work done in these businesses (i.e. system development, research and development, web-site development, inventory control). The percentage of sampled employees that worked in the high technology (97.2%), consulting (86.3%), and manufacturing (75%) industries that use computers at work were significantly greater than in other industry sectors (56%).

Table 19 - Computer Use by Sampled Employees: Comparison Between Groups

Job Type	% of employees that use computer
Managerial / Professional	82.2%
Clerical /Administrative Retail	81.8%
Technical / Production	53.6%
Company Size	% of employees that use computer
Small	76.3%
Large	68.1%
Company Industry Sector	% of employees that use computer
High Tech	97.2%
Consulting	86.3%
Manufacturing	75.0%
Other	56.0%
Company's Growth	% of employees that use computer
Increasing	74.3%
Staying The Same / Decreasing	66.0%
Total	70.2%

In addition, the percentage of sampled small (less than 50 employees) firms' employees (76.3%) that use a computer at work was significantly greater than that found in larger firms (68.1%). This finding in one sense is again consistent with the previous studies (Ein-Dor and Segev 1978; DeLone 1981; Kangan et al 1990) that report firm size and industry sectors had an impact on computer usage. On the other hand, it contradicts literature (Morissette and Drolet 1998; Baldwin et al 1999; Winston and Dologite 1999) that suggests larger business tends to made more use of computers. It is important to note that, however, these studies did not examine the impact of size (i.e. micro, small, medium, large) within the small business sector. Rather, their focus was on medium and large firms.

Finally, employees in growing (74.3%) companies were significantly more likely to use a computer at work than respondents in stable/ shrinking (66%) companies. No significance was noted for employees' attitude with the use of the computer at work. It is difficult from this data to determine exactly why growing firms use computers while stable/shrinking firms do not. It may be that the increase in firm size increases a firm's need for computers. Alternatively, it may be that the use of computers increases a firm's productivity and competitiveness, which in turn leads to greater growth. It is important that the same relationship was observed with the owners' data.

Overall, this finding suggests that employees who hold managerial /professional or clerical/administrative positions, employees working in "small" small business, employees working in high technology, consulting, or manufacturing industries, and employees working in growing companies are more likely to use computers regularly at work. In other words, for employees, it appears to be the type of work being done that dictates the use of a computer at work.

5.2.2.3. Effect of Owner Characteristics on Reliance on Computers

Table 20 summarizes the significant results for each group comparison on the reliance on computers (i.e. number of hours of computer usage per day) using the owners' survey data.

Table 20 - Reliance on Computer by Sampled Owner: Comparisons Between Groups

	F	Alpha	Mean Hours of Computer Usage by Groups			
			Micro	Small	Medium	Large
Size	3.037	0.036	5.11	3.13	3.25	3.06

The amount of daily hours of computer usage by owners that use computers at work is significantly associated with company size. Owners in micro small businesses spend significantly more hours per day on the computer (i.e. higher levels of reliance). This finding again is consistent with the previous studies (Ein-Dor and Segev 1978; DeLone 1981; Kangan et al 1990) that report firm size had an impact on computer usage. It is possible that since owners of micro firms are also “workers” and therefore, required to perform multiple tasks. And some of these tasks (i.e. budgeting, accounting) may require computer assistance.

To summarize, the data suggest that owners’ reliance on computers is negatively associated with firm size, while owners’ gender, age, education level, technology attitude, industry sector, and growth do not make a significant difference in the number of hours of computers uses. In other words, the reliance of sampled owners on computers is determined by the work being done.

5.2.2.4. Effect of Employee Characteristics on Reliance on Computer

Table 21 summarizes the significant results for each group comparison in the employees’ survey. The amount of daily hours of computer usage by those employees that use a computer at work is significantly associated with the employee’s job type.

Table 21 - Reliance on Computer by Sampled Employee: Comparisons Between Groups

	F	Alpha	Mean Hours of Computer Usage by Groups		
Job type	7.02	0.001	Managerial/ Professional	Technical/ Production	Clerical / Administrative/ Retail
			4.8	5.58	5.71

The data indicated that employees who work in technical/production and clerical/administrative/retail jobs tend to spend significantly more hours per day on the computer than those in managerial/professional positions. The data found no significant difference in the hours of computer usage between the owners' technology attitude, firm size, industry sector, and growth. In other words, the reliance of the sampled employees on computers is again determined by the work being done.

5.2.3. Penetration of Computer Application Into Small Businesses

Table 22 presents data outlining what computer applications are currently being used by the Canadian small businesses in our sample. The data are presented as follows.

Respondents that use a computer "regularly at work" were asked to indicate which of 8 types of computer application they currently use. Column 1 represents the percentage of sample owners who indicated they are presently using each application, while column 2 gives similar data for respondents in the employee survey.

Table 22 - Computer Applications Sampled Small Businesses Are Currently Using

Computer Application	Owner Yes (%)	Employee Yes (%)
Word processing	88.9%	79.9%
E-mail	81.0%	64.2%
Internet	77.8%	50.5%
Spreadsheet	66.7%	59.3%
Database	65.1%	60.1%
Custom application	50.8%	52.4%
Electronic-banking	15.9%	11.2%
CAD/CAM	7.9%	9.1%

Although every category of computer application included in this survey is being used by at least one respondent in this sample, only word processing was used by the vast majority of both samples (88.9% and 79.9% respectively). All but two applications (electronic banking and CAD/CAM) were used by at least half of both samples. This finding suggests that word processing, e-mail, Internet, spreadsheet, database and custom applications have penetrated small business sectors.

Within the applications included in this survey, few respondents said they were using CAD/CAM (7.9% of owners and 9.1% of employees) in their work. It is also interesting to note that although a majority of the respondents use Internet and email, few said they use electronic-banking (15.9% of owners and 11.2% of employees) at work.

This finding supports El-Louadi's (1996) observation that word processing applications are still the most popular application used in small business. It also supports the idea that more advanced technologies have not really penetrated small businesses.

It is also interesting to note that the use of the Internet (77.8% of owners and 50.5% of employees) and email (81% of owners and 64.2% of employees) by respondents in this sample is significantly greater than that reported by Statistics Canada in 2000 (63% of owners and 39% of employees in the whole business market including both small and large firms). One of the possible reasons is that the majority of respondents (both owners and employees) have positive attitudes towards new technology. It is likely that this positive attitude increases the probability that Internet technology will be adopted and implemented.

5.2.4. Employee Characteristics Affecting the Use of Computer Applications

To better understand the pattern of applications Canadian small business use, chi-square tests were calculated to explore the effect organization size, industry sector, company growth rate and respondent's job type have on which computer application is being used by small business employees. As the sample size of the owner data is too small, only employees' data will be used in this stage of the analyses. Complete results of the analysis are presented in Appendix IV. Table 23 summarize the significant results for each group comparison in the employees' survey.

Table 23 - How Is the Use of IT Applications Associated With Various Employees' Characteristics?

Job type	X ²	Alpha	Managerial / professional	Technical/ production	Clerical / administrative/ retail		Total
Word processing	20.067	0.000	89.4%	73.2%	75.4%		79.9%
Spreadsheet	17.854	0.000	69.1%	48.3%	53.4%		59.3%
CAD/CAM	13.364	0.001	10.6%	14.1%	2.9%		9.1%
Internet	37.566	0.000	64.8%	46.3%	34.9%		50.5%
Email	19.981	0.000	75.0%	59.7%	54.9%		64.2%
Open to technology	X ²	Alpha	Strongly Disagree/ Neutral		Strongly Agree		Total
E-mail	4.572	0.033	58.3%		67.3%		64.2%
Internet	6.521	0.011	43.2%		54.4%		50.5%
Industry sector	X ²	Alpha	Consulting	Manufacturing	High tech	Other	Total
Word Processing	20.608	0.000	80.2%	77.8%	95.2%	73.9%	79.9%
Database	33.105	0.000	66.7%	56.5%	80.8%	49.1%	60.1%
CAD/CAM	29.398	0.000	2.9%	11.1%	21.2%	3.0%	9.1%
Internet	64.901	0.000	47.6%	44.4%	85.6%	39.3%	50.5%
Email	54.210	0.000	72.7%	56.5%	90.4%	51.7%	64.2%
Company size	X ²	Alpha	Small		Large		Total
Word Processing	6.310	0.012	86.7%		77.3%		79.9%
CAD/CAM	5.737	0.017	4.4%		10.9%		9.1%
Internet	14.234	0.000	63.3%		45.7%		50.5%
Email	5.140	0.023	71.5%		61.4%		64.2%
Company growth	X ²	Alpha	Increased		Stay the same/ decreased		Total
CAD/CAM	12.986	0.000	13.2%		4.5%		9.1%
Internet	8.509	0.004	56.3%		44.0%		50.5%

The tendency to use each of the applications considered in this thesis (with the exception of electronic-banking and custom application) is significantly associated with employee job type, attitude towards technology, industry sector, firm size, company growth, and gross annual sales.

Not surprisingly, application use in small business is also associated with respondents' job type. The data suggest that employees holding managerial /professional positions are more likely to use reporting tools (i.e. word processing and spreadsheet), communication application (i.e. Internet and email) and applications that require professional expertise (i.e. CAD/CAM), while employees working in technical/production positions are more likely to use applications that require technical expertise (i.e. CAD/CAM). It should be noted that job type was not associated with the use of custom applications and electronic-banking. One of the possible reasons is that custom applications were made to suit specific job's need and thus it is moderately relied by all the respondents. On the other hand, as the use of electronic-banking is so low, no difference was observed.

Applications use was also associated with employee openness to new technology. The data indicated that employees who indicated their companies were open to new technology were more likely to use communication applications (i.e. e-mail and Internet).

With respect to company size, the data indicates that employees of smaller firms are more likely to use word processing applications than their larger counterparts, while employees of larger firms are more likely to use CAD/CAM applications. The data also suggest that Internet and email use are positively associated with company size, with employees of "small" small business being significantly less likely to use the Internet and email than their larger counterparts. This finding reinforces the literature, which

suggests that smaller businesses are less likely to be Internet capable. Company size, however, is not associated with the use of spreadsheet, database, electronic-banking and custom applications.

The use of all applications considered in this thesis (except spreadsheet, electronic-banking and custom applications) was associated with sector. This finding reinforces Kagan's et al (1990) contention that the nature of business had a great impact on the software application used. Employees in the consulting sector are more likely to use database application, while employees in the manufacturing sector are more likely to use CAD/CAM application. Finally, employees in the high tech sector are more likely to use word-processing in addition to the above applications.

The data also suggest that Internet adoption levels appear highly dependent on the nature of the industry, with the high tech and consulting sectors more likely to use Internet and email applications than their counterparts in other sectors. It is possible that as the perceived indirect benefits (business information, contacts, etc.) of Internet related applications remain stronger than the direct benefits (payments, serving and attracting customers, etc), therefore the retail, construction and agricultural sectors were not willing to invest on such technology yet.

Regarding company growth, the data indicate that the use of CAD/CAM and Internet applications are positively associated with company growth, as employees of growing firms are significantly more likely to use CAD/CAM and Internet applications. It is notable that company growth was not associated with the use of word processing,

spreadsheet, database, custom application, e-mail and electronic banking applications. It is again difficult from this data to determine exactly why growing firms use these applications while stable/shrinking firms do not. It may be that increases in firm size and profit increases their need and ability to purchase such applications. Alternatively, it may be that the use of computers increases their productivity and competitiveness, which in turn leads to increased profit/growth.

With respect to other application use, all employees, regardless of their company's characteristics, rely moderately on custom application and do not make much use of electronic banking at their work. Overall, the data suggest that job type and industry sector made the most difference in the types of application use. In other words, it appears that it is the job requirement that determines what type of application is needed and it is the money/growth that determines if you can afford the applications needed.

5.2.5. Computer Sophistication Level

As indicated in previous sections, computer/information system sophistication was divided into two parts: application sophistication and communication sophistication. For respondents that use a computer "regularly at work", their responses on the use of computer application were recoded and three categories were defined for the analysis: respondents that use only word processing applications were recoded as 1 (low application sophisticated); respondents that use spreadsheets or databases were recoded as 2 (medium application sophisticated); and respondents that use CAD/CAM or custom application were recoded as 3 (high application sophisticated). Similarly, the

use of communication application (Internet and email) were recoded, and three categories were defined for the analysis: respondents that make no use of Internet and email were recoded as 1 (low communication sophisticated); respondents that use only email were recoded as 2 (medium communication sophisticated); and respondents that use both email and Internet were recoded as 3 (high communication sophisticated).

Table 24 presents data outlining the computer/information system sophistication level of Canadian small business in this sample.

Table 24- Computer/Information System Sophistication Level

Application Sophistication Level	Owner %	Employee%
Low	11.1%	10.8%
Medium	34.9%	32.9%
High	54.0%	56.3%
Communication Sophistication Level	Owner %	Employee %
Low	17.4%	33.9%
Medium	4.8%	15.6%
High	77.8%	50.5%

5.2.5.1. Application Sophistication

Regarding application sophistication, similar patterns were found in both the owner and the employee data. The data indicate that the majority (over 50%) of the respondents (including both owners and employees) could be considered to be at the high level of application sophistication (i.e. used CAD/CAM or custom application). Further, approximately one third of the respondents made moderately sophisticated use (i.e. use spreadsheet or database) of computer applications. A minority of both samples (i.e. 6.7% of owners and 3.8% of employees) could be considered to be unsophisticated

users (i.e. low sophisticated). If we add these data to one-third of owners and 30% of employees who make no use of computers, it can be considered that approximately 37% of owners and 40% of small business employees in this sample had little to no reliance on computers in their work. In other words, if respondents use a computer at work, they tend to use applications with moderate to high sophistication. Otherwise, they do not use a computer at all.

To better understand the effect of certain characteristics of the respondent on the sophistication level of application use, chi-square tests were calculated to explore these effects. As the sample size of the owner data is too small, only employee data will be used in this stage of the analyses. Complete results of the analysis are presented in Appendix V. Table 25 summarizes the significant results for each group comparison. The level of application sophistication is significantly associated with respondents' job type and industry sector.

Table 25 - Application Sophistication: Comparison Between Groups

	Application Sophistication		
	Low	Medium	High
Job Type			
Managerial/Professional	10.6%	33.1%	56.4%
Technical / Production	8.1%	26.2%	65.8%
Clerical / Administrative/ Retail	12.6%	38.9%	48.6%
Industry sector			
Consulting	10.3%	30.2%	59.5%
Manufacturing	6.5%	29.6%	63.9%
High technology	4.8%	37.5%	57.7%
Other	15.8%	33.8%	50.4%
Total	10.8%	32.9%	56.3%

The data suggest that application sophistication level is highly dependent on the nature of the job. Respondents who hold a technical/production position were more likely to have high application sophistication, while those who hold clerical/ administrative/ retail positions were more likely to have low and moderate application sophistication. This finding is consistent and helps explain earlier data that managerial/ professional and clerical/ administrative/ retail employees were dominant users of word processing and spreadsheet applications, while technical/ production employees were dominant users of CAD/CAM applications.

The data suggested that application sophistication level was also highly dependent on the nature of the industry, as respondents in the consulting and manufacturing sectors are more likely to have high application sophistication, while respondents in the high tech sector were more likely to have moderate and high application sophistication. Respondents in the other sectors were more likely to have low application

sophistication. This finding again reinforces Kagan's et al (1990) argument that sector has a great impact on IT sophistication level.

To summarize, application sophistication level was significantly associated with respondents' job type and industry sector. The data indicated that rather than company size, industry sector and job type were better indicators of application sophistication in the small business sector.

5.2.5.2. Communication Sophistication

With respect to communication sophistication, the data indicate that in general, the owners' communication sophistication level was higher than the employees'. Three-quarters of owners were at the high level of communication sophistication (using both Internet and email) compared to 51% of employees. On the other hand, over one-third of employees were at the low level of communication sophistication (no Internet access) as compared to 18% of owners. These findings are consistent with previous studies on small business Internet use (Simon and Wilkes 1998; Statistics Canada 2001), which indicated owners are more connected than employees.

To better understand the effect of certain respondent characteristics on the sophistication level of communication applications use, chi-square tests were calculated to explore these effects. As the sample size of the owner data is too small, only employee data will be used in this stage of the analyses. Complete results of the analysis are presented in Appendix VI. Table 26 summarizes the significant results for each

group comparison for the employees' survey. The level of communication sophistication level is associated with all employee characteristics and the companies they represented.

Table 26 - Communication Sophistication: Comparison Between Groups

	Communication sophistication		
	Low	Medium	High
Job type			
Managerial/ Professional	23.3%	11.9%	64.8%
Technical/ Production	38.9%	14.8%	46.3%
Clerical/ Administrative/ Retail	43.4%	21.7%	34.9%
Open to technology			
Neutral/ Strongly disagree	40.2%	16.6%	42.3%
Strongly Agree	30.6%	15.0%	54.4%
Company size			
Small	26.6%	10.0%	63.3%
Large	36.7%	17.6%	45.7%
Industry sector			
Consulting	27.0%	25.4%	47.6%
Manufacturing	42.6%	13.0%	44.4%
High Technology	6.7%	7.7%	85.6%
Misc. Other	45.7%	15.0%	39.3%
Company Growth			
Increased	30.9%	12.8%	56.3%
Stayed the same /Decreased	37.3%	18.7%	44.0%
Total	33.9%	15.9%	50.5%

The data suggest that Internet adoption is highly dependent on the nature of jobs.

Respondents who hold managerial/professional positions were more likely to have high communication sophistication, while respondents who hold clerical/ administrative/ retail positions were more likely to have moderate and low communication sophistication. Respondents who hold technical/ production positions were also more likely to have low communication sophistication (i.e. no Internet access).

The data also suggest that Internet adoption is positively associated with respondents' attitude towards technology. Respondents who have positive attitudes towards technology were more likely to have high communication sophistication, while respondents who have negative/less favourable attitudes towards technology were more likely to have moderate and low communication sophistication. These data suggest it is the decision to adopt such technology that determines the sophistication level; when there is no resistance (with positive attitude) to the technology the sophistication level was incremental.

The data also suggest that company size had a great impact on Internet adoption. Respondents who work in "small" firms were more likely to have high communication sophistication, and those who work in "large" firms are more likely to have low and medium communication sophistication. One of the possible reasons for this finding is that, as Internet and email incurred costs such as connection and set up fees for each user, company size (cost increase as number of employee increase) was then taken into account when justifying the adoption of these applications.

The data suggest that Internet adoption is highly dependent on the nature of the industry sector. Respondents who work in the high tech sectors are more likely to have high communication sophistication, while respondents in the consulting sectors were more likely to have moderate communication sophistication. Respondents in the manufacturing and other sectors were more likely to have low communication

sophistication. This finding again reinforces Kagan's et al (1990) statement that the nature of business had a great impact on application used.

Finally, the data suggest that Internet adoption was positively associated with company growth. Respondents who work in growing firms were more likely to have high communication sophistication, while respondents who work in stable or shrinking firms were more likely to have moderate and low communication sophistication. Consistent with previous results, one of the possible reasons for the above is that as companies grow, they see the need for such technology and their ability to afford such technology increase. On the other hand, the use of Internet technology might increase companies' competitiveness, which allows them to grow.

To summarize, communication sophistication level in this sample was associated with all the characteristics of the users and the companies they represent. It is interesting to note that there are different predictors of application sophistication than communication sophistication. It is possible that as communication applications (i.e. Internet and email) incurred continuous cost (such as connection fees), company size and growth were taken into account when justifying the adoption of these applications. In addition, as the perceived benefits of communication application such as the Internet were often less visible, positive attitudes towards technology were required to adopt such technology.

6. Conclusion

This research has addressed the issue of IT usage in Canadian small businesses. This concluding section will highlight the major findings of this research in an effort to answer the research objective and questions.

The task of identifying the current trend of IT usage begins by noting that although the literature (Baker 1987; DeLone 1988; Gable 1991; Cragg and King 1993) suggested that small businesses generally lack computer knowledge and do not have enough confidence toward computer implementation, evidence from this research suggests that Canadian small businesses are becoming more open and confident, and see important benefits in implementing IT. For example, over 60% of surveyed owners feel confident in their ability to implement technology. Around 95% of surveyed owners and 64% of surveyed employees indicated they are open to trying new technology, while around 86% of owners believe successful implementation of technology is important to the future success of the company. These data suggest that technology is becoming increasingly important to doing business in Canada regardless of company size.

“What is the level of reliance on computers in the Canadian small business?” Evidence from this study and other studies in adoption of IT in the small business literature suggests that the use of computers is growing, and they are common and widely used among Canadian small businesses. For example, if we compare our results with those of Morissette and Drolet (1998), we can see that the percentage of Canadian small

business employees using computers has gone from 42% in 1994 to 66.7% in 1999 (our data). The research also suggests that Canadian small businesses are highly reliant on computers for their daily work, as the majority of users spend from almost four to five and a half hours per day on computers. The data also suggest that in general, small business employees were more reliant on the computer than were small business owners likely due to the type of work done by owners versus employees. It should be noted that Canadian small businesses in our sample still did not use computers as much as their US counterparts.

“What is the level of penetration of IT in Canadian small businesses?” The data suggest that Canadian small businesses use a variety of computer applications at work, with every application considered in this thesis currently being used in one firm or another in our sample. Word processing (89% of owners, 80% of employees) is the most commonly used application in the sampled small businesses, followed by database (65% of owners, 60% of employees), spreadsheet (67% of owners, 60% of employees), and custom applications (50% of owners, 53% of employees). Among the sampled small businesses, electronic banking and CAD/CAM applications were rarely used. This finding is consistent with other studies (Palvia 1996; Cragg and Zinateli 1995; Raymond and Pare 1992), which reported that the use of information technology is steadily on the rise in small businesses and that small businesses have started to use more diverse technologies in their daily operations.

The data also indicate that while the literature (Montazemi 1988; Burrows 1994; Glynn and Koenig 1995; Iacovou et al. 1995; Thong et al. 1996; Baldwin et al 1999) suggests small firms tend to use computers more as tools and less as a communication medium, evidence from this research indicates that the adoption of communication application such as the Internet (78% of owners, 51% of employees) and email (81% of owners, 64% of employees) is growing and was commonly used in Canadian small businesses. Evidence from this research and other studies (Simon and Wilkes 1998; Statistics Canada 2001) in the literature also report that owners of small businesses are more connected to the Internet than are employees.

“What is the level of application sophistication in Canadian small businesses?” The data indicate that although a substantial minority (40% of owners and employees) of Canadian small businesses in this sample use applications that are low in sophistication, once a business made the decision to use a computer, the majority of users in the firm will use applications with moderate (one third of owners and employees) and high (55% of owners and employees) sophistication. This finding is consistent with other studies by (Cragg and Zinateli 1995; Raymond and Pare 1992), which reported that computing efforts of small businesses have become more sophisticated. These data suggest that the major barrier of computing efforts of small businesses is the decision of adoption as opposed to the use of individual application.

“What is the level of communication sophistication in Canadian small businesses?”

Although half of the Canadian small businesses in this sample were not subscribed to

an Internet service, once a business made the decision to use a computer, the majority of users in the firm will use communication applications with high (78% of owners and 51% of employees) sophistication (i.e. use both Internet and email). These data again suggest that the cost of becoming “more sophisticated” in the use of technology does not appear to be great—the resistance to technology is in adoption rather than in use of the technology.

“Does user characteristics (i.e. age, gender, education, job type), attitude towards technology, or business factors (i.e. sector, size group, gross sales, company growth) affect the level of IT usage in small business?” The data suggest that the use of computers by Canadian small business owners is associated with industry sector, company growth and the owners’ confidence in their ability to implement new technology. The percentage of owners in consulting, manufacturing, and high tech sectors that use a computer at work was greater than of those who were in other industry sectors. This finding again reinforces Kagan’s et al (1990)’s argument that sector (and by extension the type of work being done) has a great impact on IT usage. The percentage of owners of growing firms that use a computer at work was greater than that of those who were in stable/shrinking firms. It is possible that the increase in company size increased the need for computers or alternatively, the use of computers had increased the productivity and profitability of the company. The percentage of confident owners who use a computer at work was greater than that of those who were neutral or not confident toward their ability. This finding is consistent with the literature

that owners with negative attitudes avoid investing in IT (Delone 1988) while those with positive attitudes towards IT will commit to an IT implementation (Winston 1998).

Despite what the literature said, it appears that other owners' characteristics had no impact on computer use in Canadian small businesses. One of the possible explanations was the limited size of the sample population and possibilities of response bias with those owners who do not use or like technology, and therefore, were less likely to answer the survey.

The data also suggest that the use of computers by employees in Canadian small businesses is associated with the job type of employees and the size, sector, and growth of the company they represented.

Evidence from this research and other studies in the literature suggests that job type had a great impact of the adoption of IT, as managerial/professional and clerical/administrative/ retail employees made the most of computers. The data also suggest that job type had a great impact on the reliance of computers by employees of small businesses as employees working in technical/ production and clerical/ administrative/ retail positions spend more time per day working on computers than those who hold a managerial/ professional position. It might be possible that small businesses use computers largely for operational tasks, and technical/ production and clerical/administrative/ retail employees are more associated with such tasks. Managerial/professional workers on the other hand spend more time in management/decision

making. This, is consistent with the finding on owners' reliance on computers (i.e. spend less time on the computer), it appears that it is the kind of job/work that determines the reliance on computers in small business sectors.

Evidence from this research and other studies in the literature suggests that company size and industry sector had a great impact on computer use at work. The data suggest that "small" small businesses were the dominant computer users, with over 75% using computers at work. The data also indicated that employees in the high tech and consulting sectors made the most use of computers at work. This finding is consistent with the previous studies (Ein-Dor and Segev 1978; DeLone 1981; Kangan et al 1990) that report firm size and industry sector had an impact on computer usage.

Evidence from this research also suggests that computer use is linked to company growth. One of the possible explanations is that as a company grows, computers were adopted to meet needs associated with growth. The growth also is associated with greater profits, which determine what kind of technology a company can afford. On the other hand, it might be that the adoption of computers has increased the productivity, profitability, and competitiveness of companies that adopt them. This then allows the company to grow. It is difficult to determine the direct causality from the data, as it can only be explained in a longitudinal study.

The literature does not provide a lot of data with respect to the reliance on computers in small businesses. The data suggest that owner reliance on computers is associated with the size of the company, as "micro" business owners spend more time per day working

on computers than their larger counterparts. One of the possible reasons is that as “micro” firms consist of less than 10 employees, owners had to do a higher percentage of the work. This means they are more likely to use computers as a tool to get the job done.

Data suggest that the use of individual applications is significantly associated with company background (i.e. company size, industry sector, and growth). Industry sector made the most difference in types of application use (followed by company size and growth). This finding is consistent with the study done by Kagan et al in 1990, which reported that the nature of business had a great impact on software application used. The data support our contention that job type and attitude toward technology are associated with the use of individual applications. It is important to note that, among the respondents of the survey, few made use of electronic banking. Furthermore, there is moderate reliance on custom applications in this sample. This finding again reinstates the suggestion that it is the type of job that determines the use of computer applications.

Data indicate that the level of application sophistication is associated with job type and industry sector, as it is employees in the manufacturing, consulting, and high tech sectors holding a technical/production position have the highest application sophistication. This finding was somewhat different from the study done by Kagan et al in 1990, which reported that the wholesaling, retailing, manufacturing, and professional sectors have the most sophisticated software routine. One of the possible reasons is that some of these sectors (such as wholesaling and retailing) were under-represented in the

sample. It is important to note that despite what the literature said, application sophistication was not associated with the size of the company.

The literature does not provide a lot of data with respect to the communication sophistication level in small businesses. Data suggest that the level of communication sophistication is associated with employees' job type, attitude toward technology, and the firm size, industry sector and growth of the company. The data suggest that Internet adoption is highly dependent on the nature of jobs, with managerial/professional employees making the most sophisticated use of communication technology. While size made no difference in application sophistication, the data suggest that company size had a great impact on Internet adoption. It is interesting to note that while the literature reports larger firms were more Internet capable than small firms, the data suggest that "small" firms are the most communication sophisticated (i.e. connected).

As with application sophistication, the data suggest that Internet adoption is highly dependent on the nature of the industry sector. It is important to note that those sectors that have high application sophistication might not have high communication sophistication. The data suggest that the high tech sector was the most sophisticated in this sense.

Finally, the data suggest Internet adoption was positively associated with the growth of the company. It appears that growing firms were the most sophisticated. One of the possible reasons is that Internet access is costly and therefore, only those small businesses that had better financial resources can afford to get connected. Alternatively,

it might be possible that the adoption of the Internet increases their competitiveness and allows them to explore new markets that in turn allow the company to grow. Again, with the cross-sectional data, we cannot determine the direct causality and it requires a longitudinal study to explain.

Taking these results together, the following key conclusions can be drawn:

- Apparently there are differences in the way computers/applications are used by owners and employees of Canadian small business.
- Small businesses are not the same with respect to IT usage. Factors such as size, industry sector, growth, and job type make a difference in the way IT was adopted. Among these factors, job type and industry sector made the most difference in terms of IT usage. In other words, what you do is the primary determinant of computer use, as computers can support some tasks and others cannot.
- Factors associated with use of computer application were different from those associated with use of the Internet. This finding means that one cannot assume that, with respect to IT, whoever uses high sophisticated applications will be also highly communication sophisticated.
- That the decision to adopt technology with small businesses is key. Those that do adopt appear to make use of this technology (i.e. moderate to high sophistication of use; high number of hours using each day).

6.1. Limitations

The limitations of this study constrain the interpretation of the findings and point to several issues for future research. First, this study makes use of secondary data from Duxbury and Higgins' study on human resources issues on small businesses. As the data were already collected, we had no control on the definition of small businesses and the questions asked. Additional research would benefit from looking into the following aspects of computer use:

- Education – As the current survey only studies general education and not IT-specific education, it will be interesting to find out if there is any difference between the impact of general education and IT specific education on IT usage.
- Internet – Due to the limitation of the survey question, the use of other more sophisticated “e-business” applications (i.e. whether the small business has a web site, buys online, sells online, searches of information) are not known.

Second, as the major objective of Duxbury and Higgins' study was human resource issues in small businesses, information regarding computer usage in small business was limited. Thus, we are bound by the data collected and further clarification and investigation on detail usage, satisfactions and difficulties on computers use cannot be performed. Future study that explicitly examines the computer issues in small business is recommended. It is suggested that future research explore in depth how each application was used (i.e. what types of work being supported by the application),

which applications were being used most, what type of specific application is needed, and the satisfactions and benefits of computer usage. A longitudinal study on the relationship between computer/Internet and growth (i.e. does computer use leads to company growth or vice verse?) is also recommended.

The small sample size might limit the generalization of the result. As the sample contains only 93 small business firms and 815 employees, there might be a bias in the sample data. In addition, the small sample size of the study limited the type of statistical analysis that could be done on the data. Future research may redefine “small” businesses to increase the chances of greater response rate.

While this study examines the impact industry sector had on the use of IT, some industry sectors were underrepresented. Future research needs to make an effort to increase samples from different sectors.

In addition, measure of communication sophistication is limited by fact that actual usage of the Internet/email was not determined. Future studies should include use of the technology as well as access.

Future research should also be designed to compare computer use in small business to use in medium and large businesses.

Finally, the IT field is moving so quickly that it is hard to determine what is going on. This study might have been already dated even though it was just done.

6.2. Benefits of the study

A significant difference between this study and its predecessors is its scope and content. Firstly, most of the research and study on information systems usage is in large business. Very few studies have addressed the small business environment in regard to computer and information systems usage.

Secondly, most computer/information systems usage research has been done with US companies, while this study examines computer/ Information Systems usage in Canadian firms.

Most of the existing research was performed more than a decade ago and has focused on specific small business sectors such as manufacturing. This study offers a more timely study on small business computer issues in a comparative manner. As such, this study should provide academics and practitioners with insights about the reliance and penetration of IT in the Canadian small business sector. This study should also help government identify barriers and patterns to the adoption of IT in small businesses, and thus be able to develop appropriate programs to help promote IT usage. IT usage has practical implications for vendor/service providers of management information systems and small business managers. Vendors can apply the finding to develop specific strategies in marketing their systems to small business. As evidence from this study states the importance of job type in the decision on IT adoption, vendors should design applications that benefit specific job functions. Further, Internet Service Providers should also benefit from this research as they can apply the findings regarding Internet

adoption pattern, which is different from software application usage, to identify potential users in small businesses.

Finally, it is hoped that the instrument of small business size breakdown developed in this study can be used to extend the research to other aspects of IT use in the small business environment.

7. Reference

Baker, W. H. (1987). "Status of Information Management in Small Businesses." Journal of System Management April: 10-15.

Baldwin, J. R. Innovation (1995). "The Key to Success in Small Firms." Statistics Canada.

Baldwin, J. R (1997). "The Importance of Research and Development for Innovation in Small and Large Canadian Manufacturing Firms." Statistics Canada.

Baldwin, J. R. et al 1999 "Growth of Advanced Technology Use in Canadian Manufacturing During the 1990's." Research Paper No. 105. Statistics Canada

Baldwin, J. R. and D. Sabourin, 1998 "Technology Adoption: A Comparison Between Canada and the United States" Research Paper No. 119. Statistics Canada

Berry, R. and J. Wood (1998). "A Survey of Information Technology Use by Small Business.", Proceedings of 1998 ASBE conference, Dallas, Texas, USA.

British Columbia Government (1999). "Small Business Profile '99: A Profile of Small Business Growth and Employment in British Columbia."

Burgess, S. "Information Technology in Small Business in Australia: A Summary of Recent Studies". Proceedings of 1998 USAABE conference, Clearwater, Florida, USA.

Burrows, P. (1994). "Giant Killers on the Loose." Business Week (3372): 108-110.

Business Week (1994). Mom and Pop Go High Tech. Special report: 82-90.

Canada Small Business Financing Act, 1998, C36

Carroll, J. and R. Broadhead (1998). Small Business Online: A Strategic Guide for Canadian Entrepreneurs. Scarborough, Ontario, Prentice Hall Canada Inc.

Cheney, P. H. (1983). "Getting the Most out of Your First Computer System." American Journal of Small Business 7(4): 476-485.

Coolsy, P. L., et al. (1987). "A Research Agenda for Computers and Small Business." American Journal of Small Business 11(4): 31-42.

Cragg, P. B. and M. King (1993). "Small-Firm Computing: Motivators and Inhibitors." MIS Quarterly 17(1): 47-60.

Cragg, P. B. and N. Zinateli (1995). "The Evolution of Information Systems in Small Firms." Information & Management 29: 1-8.

Daly, D.J. and S. Kitchell (1995). "Production Manager Attributes and Computer Use in Small-Sized Canadian Manufacturing Firms" Journal of Small Business & Entrepreneurship 12(2): 42-59.

Darbyshire, P. et al. (1998) . "The Internet and Small Business in Australia: Unfulfilled Dreams?" Proceedings of 1998 USAABE conference, Clearwater, Florida, USA.

DeLone, W. H. (1981). "Firm Size and the Characteristics of Computer Use." MIS Quarterly 5(4): 65-77.

DeLone, W. H. (1988). "Determinants of Success for Computer Usage in Small Business." MIS Quarterly 12(1): 51-61.

Doukidis, G. I., et al. (1994). "Trends in Information Technology in Small Businesses." Journal of End User Computing 6(4): 15-25.

Eden, L. et al. (1997) "The Production, Transfer and Spill over of Technology: Comparing Large and Small Multinationals as Technology Producers." Small Business Economics 9: (53-66).

Ein-Dor, P. and E. Segev (1978). "Organizational Context and the Success of Management Information Systems." Management Science 24(10): 1067-1077.

Ein-Dor, P. and E. Segev (1982). "Organizational Context and MIS Structure; Some Empirical Evidence." MIS Quarterly 6(3): 55-68.

El-Louadi, M. (1996), "Information Needs and Information Technology in Small and Medium-Sized Enterprises in Quebec: A Descriptive Study" Journal of Small Business & Entrepreneurship 13(3): 3-16.

Farhoomand, F. and G. P. Hryeyk (1985). "The Feasibility of Computers in Small Business Environment." American Journal of Small Business 9(4): 15-22.

Fariselli et al (1999) "Electronic Commerce and the Future for SMEs in a Global Market-Place: Networking and Public Policies." Small Business Economics 12: 261-275

Gable, G. G. (1991). "Consultant Engagement for Computer System Selection: A Pro-Active Client Role in Small Business." Information & Management (20): 83-93.

Ghorab, K. (1997). "The Impact of Technology Acceptance Considerations on System Usage, and Adopted Level of Technological Sophistication: An Empirical Investigation." International Journal of Information Management 17(4): 249-259.

Glynn, K. and M. E. D. Koenig (1995). "Small Business and Information Technology." Annual Review of information science and technology 30: 251-280.

Grise, A. et al. (1989) "Computerization in Quebec: Profile and Demand." Quebec: Les Publication du Quebec , 16

Harrison, D. A., et al. (1997). "Executive Decisions About Adoption of Information Technology in Small Business: Theory and Empirical Tests." Information Systems Research 8(2): 171-195.

Iacovou, C. L., et al (1995) "Electronic Data Interchanges and Small Organizations: Adoption and Impact of Technology." MIS Quarterly 19(4): 465-485.

Igbaria, M., et al. (1997). "Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model." MIS Quarterly: 279-305.

Kagan, A., et al. (1990). "Information System Usage within Small Business Firms." Entrepreneurship Theory and Practice (Spring): 25-37.

Lees, J and D. Lees (1987). "Realities of Small Business Information System Implementation." Journal of Systems Management (January) 6-13

Lehman, J. (1985). "Organization Size and Information Systems Sophistication." Working Paper#85-18, MIS Research Center, University of Minnesota.

Levy, M and P. Powell (1998) "SME Flexibility and the Role of Information Systems" Small Business Economics (11): 183-196

Lin, B., et al. (1993). "Information Technology Strategies for Small Business." Journal of Applied Business Research 9(2): 25-29.

Lin, Z, et al 1999 "The Entry and Exit Dynamics of Self-Employment in Canada" Research Paper No. 134. Statistics Canada

Lincole, D. and W. Warberg (1987), "The Role of Microcomputers in Small Business Marketing" Journal of Small Business Management 25(2): 8-17.

Mahmood, M. A. and G. J. Mann (1993). "Impact of Information Technology Investment: An Empirical Assessment." Journal of Accounting, Management and Information Technology 3(1): 23-32.

Malone, S. C. (1985). "Computerizing Small Business Information Systems." Journal of Small Business Management (April): 10-16.

Masten, J., et al. (1995). "Small Business Strategic Planning and Technology Transfer: The Use of Publicly Supported Assistance Agencies." Journal of Small Business Management April: 10-16.

Montazemi, A. R. (1988). "Factors Affecting Information Satisfaction in the Context of the Small Business Environment." MIS Quarterly 12(2): 239-256.

Morissette, R. and M. Drolet 1998 "Computers, Fax Machines and Wages in Canada: What Really Matters?" Research Paper No 126, Statistics Canada

Nickell, G. S. and P. C. Seado (1986). "The Impact of Attitudes and Experience on Small Business Computer Use." American Journal of Small Business 10(1): 37-48.

Ontario Government (1995). "The Ontario Economy. "

Palvia, P. et al. (1994). "Determinants of computing in very small businesses." Information & Management 27: 161-174.

Palvia, P. C. (1996). "A Model and Instrument for Measuring Small Business User Satisfaction with Information Technology." Information & Management 31: 151-163.

Palvia, P. C. and S. C. Palvia (1999). "An Examination of the IT Satisfaction of Small-Business Users." Information & Management 35: 127-137.

Ray, C. M., et al. (1994). "Small Business Attitudes toward Computers." Journal of end-user computing 6(1): 16-25.

Raymond, L. (1985). "Organizational Characteristics and MIS Success in the Context of Small Business." MIS Quarterly 9(1): 37-52.

Raymond, L. and G. Pare (1992). "Measurement of Information Technology Sophistication in Small Manufacturing Businesses." Information Resource Management Journal 5(2): 1-13.

Shah, V., et al. (1998). "The Use of Computer Networking in Small Business: An Empirical Study.", Proceedings of 1998 ASBE conference, Dallas, Texas, USA.

Simon, J. and R. Wilkes (1998). "Profile of Internet Use by Small Businesses.", Proceedings of 1998 ASBE conference, Dallas, Texas, USA.

Soh, C., et al (1992). "Impact of consultants on computerization success in small Businesses." Information & Management (22): 309-319.

Statistics Canada 2000 "Advanced technology and competitiveness in Canadian manufacturing" Innovation Analysis Bulletin 2(1)

Statistics Canada 2000 "Use and planned use of advanced technologies and advanced practices in the construction sector" Innovation Analysis Bulletin 2(3)

Statistics Canada 2001 "Electronic commerce and technology 2000" Innovation Analysis Bulletin 3(2)

Szanja, B. and R. W. Scamell (1993). "The Effects of Information System User Expectations on Their Performance and Perceptions." MIS Quarterly December: 493-515.

Thong, J. K. L., et al. (1996). "Top Management Support, External Expertise and Information Systems Implementation in Small Businesses." Information Systems Research 7(2): 248-267.

Tjepkema, M. and J. Brunet (2000) "Frequently-asked Questions on Small Business." Insights On 4(1): 1-5.

Weinstein, A. (1994). "Market Definition in Technology-Based Industry: A Comparative Study of Small Versus Non-Small Companies." Journal of Small Business Management 32(4): 28-36.

Welsh, J. A. and J. F. White (1981). "Small Business Is Not a Little Big Business." Harvard Business review 59 No 4: 18-32.

Winston E. R. (1998), "How Attitude Impacts Information Technology Implementation Quality: An Exploratory Investigation of the Small Business Entrepreneur," 1998 *Proceedings: Americas Conference on Information Systems*, Baltimore, MD, USA.

Winston, E. R. and D. G. Dologite (1999). "Achieving It Infusion: A Conceptual Model for Small Businesses." Information resources management journal 12(1): 26-38.

Appendix I - Owner Questionnaire

HUMAN RESOURCE ISSUES¹ IN SMALL BUSINESSES (OWNER SURVEY)

Please be assured that your responses will be held in **confidence** by the researchers.

Please answer all the questions and return the questionnaire in the envelope provided.

Please note that throughout the questionnaire N/A means Not Applicable and DAILY⁺⁺ means More Than Daily.

Thank you for taking the time to fill out this questionnaire. Your response is greatly appreciated.

Linda Duxbury
Professor
School of Business
Carleton University
Ottawa, Ontario
K1S 5B6
(613) 52085

Christopher Higgins
Associate Professor
Western Business School
University of Western Ontario
London, Ontario
N6A 3K7
(519) 661-3269

¹It is the responsibility of the human resource function to promote the efficient use of human resources to assure an on-going succession of well-trained employees, to maintain morale and productivity and to promote a quality of work life that brings out the best in employees. In other words, to optimize the companies' investment in their people.

SECTION I: INFORMATION ON YOUR BUSINESS

This section asks you questions about your organization. This information will allow us to group your answers with all other businesses which have participated in this study. Please **CIRCLE** the most appropriate answer for each question or **FILL IN** the requested information.

1. What is your company Postal Code? _____ POSTAL CODE ***
2. How would you classify your company with respect to Industry Sector membership?

A. Manufacturing	G. Real Estate
B. Wholesale	H. Education/Health/Social Services
C. Retail	I. Accommodation/Food and Beverages
D. Natural Resources	J. High technology
E. Construction	K. Financial
F. Transportation/communication	L. Agricultural
M. Other (Please Specify) _____	
3. In total, how many years of business experience do you have in this industry?
_____ YEARS
4. What was your company's gross annual revenue or sales for the most recent fiscal year?

A. \$Nil
B. \$1 to \$249,999
C. \$250,000 to \$499,000
D. \$500,000 to \$999,000
E. \$1,000,000 to \$4,999,999
F. Over \$5,000,000
5. Excluding the owners, how many:

Full-time employees does your company have?	_____ PEOPLE
Part-time employees does your company have?	_____ PEOPLE
Temporary or seasonal employees does your company have?	_____ PEOPLE

6. How many years has your business been in operation? _____ YEARS

NOTE: If your company has been in business for fewer than 2 years, please skip to Question 8

7. Compared to the number of full-time employees your company had two years ago, has the number of full-time employees in your company:

A. Increased? Yes ↑ by _____ PEOPLE

B. Decreased? Yes ↓ by _____ PEOPLE

C. Stayed the same

	NO	YES
8. Does your company export products outside of Canada?	N	Y
9. Is your business operated out of your home?	N	Y
10. Is your business a franchise operation?	N	Y
11. Is your business unionized?	N	Y
12. Is your business incorporated?	N	Y
13. Is your business a partnership	N	Y
14. What was your motive for starting this company? (Please circle all that apply)		
A. Could do it better myself		
B. Could not stand corporate life		
C. Did not like working for others		
D. Always wanted to be an entrepreneur		
E. The opportunity presented itself		
F. I was downsized out of a job/could not get other employment		
G. I saw a need		
H. Other (Please specify) _____		

15. Do you have access to the INTERNET?

A. NO

B. YES → I use the Internet for approximately _____ HOURS PER DAY
I use the Internet to _____

16. Do you use a computer regularly in your work?

A. NO

B. YES → I use a computer for approximately _____ HOURS PER DAY

I use a computer to _____

17. In total how many owners does this business have? _____ OWNERS

18. What percent of the owners are involved in the day-to-day operation of the company? _____ PERCENT

19. What percent of the owners are female? _____ PERCENT

SECTION II: HUMAN RESOURCE PRACTICES IN YOUR BUSINESS

The field of personnel, or what is now called human resource management, is very important to the ultimate success of any company. It is the responsibility of the human resource function to promote the efficient use of human resources to assure an on-going succession of well-trained employees, to maintain morale and productivity and to promote a quality of work life that brings out the best in employees. In other words, to optimize the companies' investment in their people. This section asks you questions about how the human resource function is managed in your business. Please CIRCLE the most appropriate answer for each question or FILL IN the requested information.

20. Who handles human resource management (compensation, hiring, firing, performance appraisal) issues within your company?
- A. Company owner(s)
 - B. A manager has been given responsibility for this function
 - C. Human resources department
 - D. No one officially manages this function
 - E. Other (Please Specify) _____
21. Approximately what percent of your sales revenue is spent on: employee training and development _____ PERCENT
22. How do you recruit new employees? (Please circle all that apply)
- A. Newspaper
 - B. Government employment agency
 - C. Private employment agency
 - D. Referrals
 - E. Walk ins
 - F. Radio
 - G. Friends and relatives
 - H. Other (Please Specify) _____
23. Do you have a written business plan (i.e. a three year plan that sets out goals and priorities for your company)?
- A. YES
 - B. NO → Please skip to Question 25

24. To what extent are human resource planning and development integrated into your overall business plan?

COMPLETELY
INTEGRATED

MODERATELY
INTEGRATED

NOT INTEGRATED
AT ALL

|

1

2

|

3

4

|

5

25. How do you determine compensation in your organization? (Please Circle all that apply)

A. Market rate

B. Performance appraisal

C. Job requirements

D. Experience/seniority

E. Minimum Wage

F. Union contract

G. Other (Please Specify) _____

26. Does your organization offer some form of incentive package?

A. NO

B. YES (please specify) _____

27. To what extent do you agree or disagree with the following statements:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
I maintain control over Human Resources issues in my company	1	2	3	4	5
I maintain control over most aspects of this business	1	2	3	4	5
My management team is experienced	1	2	3	4	5
I am open to trying new technology	1	2	3	4	5
I have trust and confidence in my employees	1	2	3	4	5
I make every effort to communicate to my employees where the company is going	1	2	3	4	5
My employees understand how their work contributes to achieving the objectives of this company	1	2	3	4	5
Conditions at my company allow my employees to be about as productive as they can be	1	2	3	4	5
My company has a sincere interest in the well-being of its employees	1	2	3	4	5
My company promotes an environment that supports a balance between work and personal life	1	2	3	4	5
My company provides challenging developmental opportunities for people	1	2	3	4	5

28. How confident do you feel regarding your ability to:

	VERY CONFIDENT		MODERATELY CONFIDENT		NOT VERY CONFIDENT
Explain your company's benefit program	1	2	3	4	5
Counsel an employee who has personal problems	1	2	3	4	5
Plan and control the use of your personal Time	1	2	3	4	5
Maintain harmony within your organization	1	2	3	4	5
Motivate your employees	1	2	3	4	5
Conduct a group meeting	1	2	3	4	5
Set realistic goals for your company	1	2	3	4	5
Enforce disciplinary rules	1	2	3	4	5
Talk to employees on a one to one basis	1	2	3	4	5
Conduct formal employee performance reviews	1	2	3	4	5
Solve organizational problems as they arise	1	2	3	4	5
Develop new ideas to improve productivity	1	2	3	4	5
Write clear memos, letters and reports	1	2	3	4	5
Provide constructive feedback to employees	1	2	3	4	5
Recruit skilled personnel	1	2	3	4	5
Implement technology	1	2	3	4	5

29. To what extent do you agree or disagree with the following statements:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
Most employees work harder after a pay raise	1	2	3	4	5
Employees in my company generally like working here	1	2	3	4	5
Most employees willingly accept responsibility for their work	1	2	3	4	5
Most employees have to be pushed to produce	1	2	3	4	5
Few of my employees worry about job security	1	2	3	4	5
Most employees want to do a good job	1	2	3	4	5
The main work interest of most employees is to get enough money to do what they want	1	2	3	4	5
Most employees appreciate praise from their boss	1	2	3	4	5
Few of my employees require close supervision	1	2	3	4	5

30. Which of the following human resources issues would you consider to be important to the future success of your business?

	VERY IMPORTANT	MODERATELY IMPORTANT	NOT IMPORTANT		
Ability to offer employees competitive wages	1	2	3	4	5
Availability of quality workers	1	2	3	4	5
Ability to offer employees competitive employee benefits	1	2	3	4	5
Governmental regulations regarding hiring and firing of employees	1	2	3	4	5
Ability to train and develop employees	1	2	3	4	5
Ability to offer employees some form of job security	1	2	3	4	5
Competition for the best employees	1	2	3	4	5
Ability to deliver services customers want	1	2	3	4	5
Communication with employees	1	2	3	4	5
Ability to produce a high quality product for a competitive price	1	2	3	4	5
Quality of Work life/Balance between work and life	1	2	3	4	5
Successful implementation of technology	1	2	3	4	5
Ability to motivate employees	1	2	3	4	5

31. How often during the last three months have you had to deal with the following types of problems? (Please note that DAILY⁺⁺ means more once a day).

	Never	Mthly	Wkly	Daily	Daily⁺⁺
Conflicts between your employees	1	2	3	4	5
Damaged or rejected work	1	2	3	4	5
Inadequacies in product procedure specifications or instructions	1	2	3	4	5
Employee absences or lateness	1	2	3	4	5
Work force shortages	1	2	3	4	5
Enforcing rules and regulations	1	2	3	4	5
Employees with deep personal or emotional problems	1	2	3	4	5
Customer complaints	1	2	3	4	5
Employees complaints	1	2	3	4	5

32. All things considered, what do you consider to be the most critical human resource issue within your company?

SECTION III: YOUR JOB

The following questions ask about your work and your role as business owner. Please **CIRCLE** the most appropriate answer for each of the following questions.

33. Please indicate the extent to which you agree or disagree with each of the following statements:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
I work under a great deal of tension	1	2	3	4	5
I have felt fidgety or nervous as a result of my job	1	2	3	4	5
If I had a different job, my health would probably improve	1	2	3	4	5
Problems associated with my job have kept me awake at night	1	2	3	4	5
I often "take my job home with me" in the sense that I think about it when doing other things	1	2	3	4	5

34. I like owning a small business because it offers me the following rewards:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
Greater task variety (i.e. you get to do a lot of different things)	1	2	3	4	5
More opportunities to develop a variety of skills	1	2	3	4	5
An increased opportunity for personal growth	1	2	3	4	5
A high sense of support from my work colleagues	1	2	3	4	5
An opportunity to participate in all aspects of the business	1	2	3	4	5
Greater participation in the decision making process	1	2	3	4	5
An increased sense of accomplishment (can see something through from beginning to end)	1	2	3	4	5
Greater freedom to schedule my work and my work day	1	2	3	4	5

SECTION IV: PHYSICAL AND MENTAL HEALTH

The following questions assess stress and coping. Please CIRCLE the appropriate answer.

35. How often in the last month have you (CIRCLE the number appropriate for each statement):

	NEVER		SOMETIMES		ALWAYS
Been upset because something happened unexpectedly?	1	2	3	4	5
Felt that you were unable to control important things in your life?	1	2	3	4	5
Felt nervous or "stressed"?	1	2	3	4	5
Felt confident about your ability to handle your personal problems?	1	2	3	4	5
Felt that things were going your way?	1	2	3	4	5
Found that you could not cope?	1	2	3	4	5
Been able to control irritations in your life?	1	2	3	4	5
Felt you were on top of things?	1	2	3	4	5
Been angered because of things that happened that were outside of your control?	1	2	3	4	5
Felt difficulties were piling up so high that you could not overcome them?	1	2	3	4	5
Felt "burned out" from your job	1	2	3	4	5
Felt fatigued when you got up in the morning and had to face another day on the job	1	2	3	4	5

36. All things considered, how would you rate your own physical health?

EXCELLENT		AVERAGE		POOR
1	2	3	4	5

37. To what extent do you agree or disagree with each of the following statements

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
I feel I have more to do than I can comfortably handle	1	2	3	4	5
I feel physically drained when I get home from work	1	2	3	4	5
I feel emotionally drained when I get home from work	1	2	3	4	5
I feel I have to rush to get everything done each day	1	2	3	4	5
I feel I don't have enough time for myself	1	2	3	4	5
I have a good balance between my job and my family	1	2	3	4	5
My time off work does not match other family members' schedules well	1	2	3	4	5
My job keeps me away from my family too much	1	2	3	4	5

38. In the last 3 months, how many times have you seen a physician

(Not counting regular and maternity-related check-ups)? _____TIMES

39. In the last 3 months, how many days have you:

Been unable to work or carry out your usual activities because of health problems?
_____DAYS

Been unable to work or carry out your usual activities because of family-related problems (i.e., sick child, elder care problem)? _____DAYS

Taken a day off because you were emotionally, physically or mentally fatigued?
_____DAYS

Missed time during a work day (e.g., arrived late, left early, left and returned) due to personal/family responsibilities? _____TIMES _____ HOURS MISSED

40. How frequently do you use the following strategies to cope with stress?

	NEVER		SOMETIMES		ALWAYS
I talk things over with my spouse/partner	1	2	3	4	5
I talk things over with my friends	1	2	3	4	5
I talk things over with my colleagues at work	1	2	3	4	5
I talk things over with my manager	1	2	3	4	5
I get help from my co-workers	1	2	3	4	5
I get help from my manager	1	2	3	4	5
I get help from my family	1	2	3	4	5
I work harder (I try and do it all)	1	2	3	4	5
I prioritize	1	2	3	4	5
I delegate work to others	1	2	3	4	5
I seek professional help (counsellor, clergy, etc)	1	2	3	4	5
Other (please specify)_____	1	2	3	4	5

SECTION V: INFORMATION ABOUT YOU

We need some information about you to help us interpret this questionnaire. To answer the following questions, please **CIRCLE** the letter of the answer which best describes you and/or **FILL IN** the information requested. Please be assured that your responses will be held in confidence by the researchers.

41. What is your gender?

A. Male

B. Female

42. What is your age? _____ YEARS

43. What is your present marital status? (CIRCLE all that apply)

A. Never married

B. Married or living with a significant other

C. Divorced

D. Separated

E. Widowed

44. How many children do you have? _____ CHILDREN

(if zero → Please skip to question 46)

45. We are interested in how old your children are. Please fill in the relevant information below.

Child# 1 _____ YEARS OLD

Child# 4 _____ YEARS OLD

Child# 2 _____ YEARS OLD

Child# 5 _____ YEARS OLD

Child# 3 _____ YEARS OLD

Child# 6 _____ YEARS OLD

46. Please indicate the number of elderly dependents in each of the following categories.

Living in your home _____

Living elsewhere _____

47. Please CIRCLE the letter which BEST describes your educational background:

- A. Some high school
- B. High school diploma
- C. Some college/some university
- D. College diploma
- E. University degree
- F. Post-graduate degree

48. Please CIRCLE the category which BEST describes:

YOUR PERSONAL INCOME

YOUR TOTAL FAMILY INCOME

BEFORE TAXES

BEFORE TAXES

- 1. Less than \$19,999
- 2. \$20,000 to \$39,999
- 3. \$40,000 to \$59,999
- 4. \$60,000 to \$79,999
- 5. \$80,000 to \$99,999
- 6. More than \$100,000

- 1. Less than \$19,999
- 2. \$20,000 to \$39,999
- 3. \$40,000 to \$59,999
- 4. \$60,000 to \$79,999
- 5. \$80,000 to \$99,999
- 6. \$100,000 to \$120,999
- 7. More than \$120,000

49. How many individuals report directly to you? _____ PEOPLE

50. At present, approximately how many hours per week do you spend:

In paid employment overall _____ HOURS/WEEK

In home chores and errands _____ HOURS/WEEK

In childcare or activities with your children _____ HOURS/WEEK

In self-related activities _____ HOURS/WEEK
(e.g. activities alone, with partner, or with friends)

In volunteer activities _____ HOURS/WEEK

Caring for elderly dependents _____ HOURS/WEEK

51. Approximately how many hours/week does your significant other spend in paid employment?

_____ HOURS/WEEK

N/A

Would you be willing to be interviewed in order to contribute to a better understanding of human resource issues in small businesses? If so, please fill in your first name and telephone number.

FIRST NAME _____

TELEPHONE: () _____

Thank you for completing this questionnaire.

Please be assured that your responses will be held in confidence by the researchers. Only aggregate responses will be reported.

Dr. Chris Higgins

Dr. Linda Duxbury

(519) 661-3269

(613) 520-2385

Appendix II - Employee Questionnaire

HUMAN RESOURCE ISSUES IN SMALL BUSINESSES² (EMPLOYEE SURVEY)

Please be assured that your responses will be held in **confidence** by the researchers.

Please answer all the questions and return the questionnaire in the envelope provided.

Please note that throughout the questionnaire N/A means Not Applicable and DAILY⁺⁺ means More Than Daily.

Thank you for taking the time to fill out this questionnaire. Your response is greatly appreciated.

Linda Duxbury
Associate Professor
School of Business
Carleton University
Ottawa, Ontario
K1S 5B6
(613) 52085

Christopher Higgins
Associate Professor
Western Business School
University of Western Ontario
London, Ontario
N6A 3K7
(519) 661-3269

² It is the responsibility of the human resource function to promote the efficient use of human resources to assure an on-going succession of well-trained employees, to maintain morale and productivity and to promote a quality of work life that brings out the best in employees. In other words, to optimize the companies' investment in their people.

SECTION I YOUR JOB

The following questions ask about your job and experiences with your employer. Please **CIRCLE** the most appropriate answer for each of the following questions.

1. Please indicate the extent to which you agree or disagree with each of the following statements:

	STRONGLY DISAGREE		NEUTRAL		STRONGLY AGREE
I am willing to put in a great deal of effort in order to help this company be successful	1	2	3	4	5
I promote my company to my friends as a great company to work for	1	2	3	4	5
I would accept almost any type of job assignment in order to keep working for this company	1	2	3	4	5
I find that my values and my company's values are very similar	1	2	3	4	5
I am proud to tell others that I am part of this company	1	2	3	4	5
My company really inspires the very best in me in the way of job performance	1	2	3	4	5
I am extremely glad that I chose this company to work for over others when I was considering at the time I joined	1	2	3	4	5
I really care about the fate of this company	1	2	3	4	5
I will probably look for a new job in the next year.	1	2	3	4	5
I often think about quitting	1	2	3	4	5

2. The following questions ask about your future with your company. **CIRCLE** the number that best describes how you feel about:

	VERY WORRIED		MIXED FEELINGS		VERY GOOD
Your future with your company?	1	2	3	4	5
Your ability to advance within your company?	1	2	3	4	5

3. Please indicate the extent to which you agree or disagree with each of the following statements:

	STRONGLY DISAGREE		NEUTRAL		STRONGLY AGREE
I work under a great deal of tension	1	2	3	4	5
I have felt fidgety or nervous as a result of my job	1	2	3	4	5
If I had a different job, my health would probably improve	1	2	3	4	5
Problems associated with my job have kept me awake at night	1	2	3	4	5
I often "take my job home with me" in the sense that I think about it when doing other things	1	2	3	4	5

4. Different people want different things from their work. Here is a list of things a person could get from his or her job. How Important are each of the following to you?

	VERY CONFIDENT		MODERATELY CONFIDENT		NOT VERY CONFIDENT
The amount of pay you get	1	2	3	4	5
The opportunity to develop your skills and abilities	1	2	3	4	5
The amount of job security you have	1	2	3	4	5
The chances you have to learn new things	1	2	3	4	5
Your chances for getting a promotion or a better job	1	2	3	4	5
The amount of freedom you have on the job	1	2	3	4	5
The respect you get from the people you work with	1	2	3	4	5
The friendliness of the people you work with	1	2	3	4	5

5. Please indicate how satisfied you are with:

	VERY DISSATISFIED		NEUTRAL	VERY SATISFIED	
Your job in general	1	2	3	4	5
The amount of pay you get	1	2	3	4	5
The number of hours you work	1	2	3	4	5
The schedule of your working hours	1	2	3	4	5
The sorts of things you do on the job	1	2	3	4	5
Your current work load	1	2	3	4	5
The amount of time you have at work to plan what has to be done	1	2	3	4	5
The training and development opportunities offered by your company	1	2	3	4	5
The type of benefits you receive from your company	1	2	3	4	5
The types of tools and equipment available at your workplace	1	2	3	4	5
Advancement opportunities within your organization	1	2	3	4	5
The openness of company management	1	2	3	4	5
The amount of attention your company pays to workplace safety	1	2	3	4	5
Your involvement in decisions that affect your work	1	2	3	4	5
The way company policies are put into practice	1	2	3	4	5
Working conditions at your place of work	1	2	3	4	5
The amount of job security you have	1	2	3	4	5
The chances you have to learn new things	1	2	3	4	5
The respect you receive from your boss	1	2	3	4	5
The respect you receive from the people you work with	1	2	3	4	5
The amount of support and guidance you receive from your boss	1	2	3	4	5

6. How easy or difficult is it for you:

	EASY		NEITHER		DIFFICULT
To vary your working hours? (i.e. arrival and departure times)	1	2	3	4	5
To spend some of your regular work day working at home?	1	2	3	4	5
To take your holidays?	1	2	3	4	5
To take time off to attend a course or conference?	1	2	3	4	5
To interrupt your work day for personal reasons and then return to work?	1	2	3	4	5
To keep regular hours?	1	2	3	4	5
To keep family commitments?	1	2	3	4	5
To make or receive personal phone calls while you are at work?	1	2	3	4	5
To balance your work and personal/family commitments?	1	2	3	4	5

7. What is your employment status?

- A. FULL TIME EMPLOYEE
- B. PART-TIME EMPLOYEE
- C. SEASONAL OR TEMPORARY EMPLOYEE

8. In your current position are you required to work shifts?

- A. NO
- B. YES

9. In your current position are you required to work evenings?

- A. NO
- B. YES

10. How are you paid for the work that you do?

- A. I receive a fixed salary (i.e. weekly, biweekly, monthly)
- B. I am paid by the hour
- C. I am paid a piecework rate
- D. Other (please specify) _____

11. Are you required to punch or sign in and out when beginning and ending work?

A. NO

B. YES

12. Are you paid for overtime work?

A. NO

B. YES → Who determines overtime hours?

a. YOU

b. EMPLOYER

c. BOTH

d. OTHER

13. Does your organization offer some form of incentive package (e.g. bonus program)?

A. NO

B. YES

SECTION II: WORKING FOR A SMALL BUSINESS

The following questions ask about your experiences working in a small business. Please **CIRCLE** the most appropriate answer for each question or **FILL IN** the requested information.

14. To what extent do you agree or disagree with the following statements:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
In our company, people management is very "hands on" by the owner(s)	1	2	3	4	5
We have strong control from the owner(s)	1	2	3	4	5
We have a good team	1	2	3	4	5
We are open to trying new technology	1	2	3	4	5
I have trust and confidence in the owner of this business	1	2	3	4	5
The business owner has communicated the company's future directions	1	2	3	4	5
I understand how my work contributes to achieving the goals of this company	1	2	3	4	5
Conditions at my company allow me to be about as productive as I can be	1	2	3	4	5
I would recommend this company as a good place to work	1	2	3	4	5
This company has a sincere interest in the well being of its employees	1	2	3	4	5
This company promotes an environment that supports a balance between work and personal life	1	2	3	4	5
This company urges employees to get the training they need to advance in this organization.	1	2	3	4	5
This company encourages employees to get the training they need to perform their work.	1	2	3	4	5
This company gives employees time off for training	1	2	3	4	5
This company helps employees with the costs of training	1	2	3	4	5

15. I like working for a small business because it offers me the following rewards:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
Greater task variety (i.e. you get to do a lot of different things)	1	2	3	4	5
More opportunities to develop a variety of skills	1	2	3	4	5
An increased opportunity for personal growth	1	2	3	4	5
The feeling that I am part of a “family” (not just a number)	1	2	3	4	5
A high sense of support from my colleagues and my boss	1	2	3	4	5
An opportunity to participate in all aspects of the business	1	2	3	4	5
Greater participation in the decision making process	1	2	3	4	5
An increased sense of accomplishment (can see something through from beginning to end)	1	2	3	4	5
Greater freedom to schedule my work and my work day	1	2	3	4	5

16. I find working for a small business challenging because:

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
Advancement opportunities are more limited	1	2	3	4	5
The pay is lower	1	2	3	4	5
I worry about whether the company (and hence the job) will be around one year from now (i.e. lower job security)	1	2	3	4	5
There are fewer fringe benefits	1	2	3	4	5
The opportunity to participate in decision making is limited (decision making is in the hands of the owner)	1	2	3	4	5
Work loads are too heavy	1	2	3	4	5
There is no one to cover for you if you are sick, rushed etc	1	2	3	4	5
I have too much responsibility	1	2	3	4	5
I have less freedom to schedule my work and work day	1	2	3	4	5

17. What does the owner of the business you work for *currently* do to make it easier for you to do your job?

18. What *could* the owner of the business you work for do to make it easier for you to do your job?

SECTION III: YOUR MANAGER/THE BUSINESS OWNER

The following questions ask about your experiences with your immediate manager. Please think about the individual who manages your work (Note: This individual may also be an owner of the company you work for) and indicate the extent to which you agree or disagree with the following statements by **CIRCLING** the most appropriate answer for each question.

19. My Manager:

	STRONGLY DISAGREE		NEUTRAL		STRONGLY AGREE
Gives recognition when I do my job well	1	2	3	4	5
Provides constructive feedback when performance standards are not met.	1	2	3	4	5
Displays favouritism in assigning work tasks and promotions	1	2	3	4	5
Listens to my concerns	1	2	3	4	5
"Puts me down" in front of colleagues or clients	1	2	3	4	5
Shares information with me	1	2	3	4	5
Is available to answer questions	1	2	3	4	5
Only talks to me when I make a mistake	1	2	3	4	5
Recognizes I have a life outside of work	1	2	3	4	5
Makes me feel guilty about sick days and time off for family reasons	1	2	3	4	5
Gives me feedback on a regular basis	1	2	3	4	5
Encourages me to make decisions on my own	1	2	3	4	5
Focuses on hours of work rather than output	1	2	3	4	5
Makes sure I have the tools/equipment I need to do my job	1	2	3	4	5
Makes sure I have the training I need to do my job	1	2	3	4	5
Communicates clearly the work to be done	1	2	3	4	5
Is effective at planning the work to be done	1	2	3	4	5
Displays a thorough understanding of the industry's current environment	1	2	3	4	5

	STRONGLY DISAGREE		NEUTRAL	STRONGLY AGREE	
Cares about the well being of his/her employees	1	2	3	4	5
Asks for input before making decisions that will affect my work	1	2	3	4	5

SECTION IV: PRODUCTIVITY

This section asks a number of questions about how your work environment influences your ability to do your job. Please **CIRCLE** the appropriate answer for each of the following questions. (Please note that **DAILY⁺⁺** means more once a day).

20. How often during the last three months:

	Never 	Mthly 	Wkly 	Daily 	Daily ⁺⁺
Did the stresses and strains from working long hours reduce your productivity?	1	2	3	4	5
Did the amount of work you had to do interfere with how well it got done?	1	2	3	4	5
Did the working conditions in your area made it difficult to be productive?	1	2	3	4	5
Did you feel encouraged to come up with new/better ways of doing thing?	1	2	3	4	5
Did you deliver you work on time?	1	2	3	4	5
Did you try to improve work methods to solve work problems?	1	2	3	4	5
Did you spend time trying to develop your skills and abilities to do a better job?	1	2	3	4	5
Did you feel frustrated when trying to do your job?	1	2	3	4	5
Did you automatically increase your work pace and shorten your work breaks when work pressures increased?	1	2	3	4	5
Did you stay late to finish work?	1	2	3	4	5
Did you have a sense of achievement in performing your job?	1	2	3	4	5
Did schedule changes or unplanned work reduce your productivity?	1	2	3	4	5
Did stress and strain from business travel reduce your productivity?	1	2	3	4	5
Did you take work home to complete in the evenings?	1	2	3	4	5

SECTION V: TRAINING AND DEVELOPMENT

Training is a set of activities that provides learning opportunities to acquire and improve job related skills. It applies to both the initial training of employees and to upgrading or improving someone's skills to meet changing job requirements. This section asks a number of questions about how your company trains and develops their employees. Please **CIRCLE** the appropriate answer or **FILL IN** the information.

21. How would you evaluate your current skill level with respect to your present job?

UNDER SKILLED		ADEQUATELY SKILLED		OVER SKILLED
1	2	3	4	5

22. To what extent does your company invest in training and other activities to increase your skill level?

NO EXTENT	MODERATE EXTENT		HIGH EXTENT	
1	2	3	4	5

23. Which of the following descriptions best fits your training experiences over the past year:

- A. Frequent short training sessions
- B. Infrequent, broader skills training.
- C. I did not receive any training in the last year → Please skip to Question 26.

24. Please estimate how much money was spent on your training and development over the past 12 months by

You personally _____ \$

Your employer _____ \$

Other _____ \$

25. Please estimate the amount of time you spent in training and development activities over the past 12 months: _____ HOURS

SECTION VI: PHYSICAL AND MENTAL HEALTH

The following questions assess stress and coping. Please **CIRCLE** the appropriate answer.

26. How often in the **last month** have you (**CIRCLE** the number appropriate for each statement):

	NEVER		SOMETIMES		ALWAYS
Been upset because something happened unexpectedly?	1	2	3	4	5
Felt that you were unable to control important things in your life?	1	2	3	4	5
Felt nervous or "stressed"?	1	2	3	4	5
Felt confident about your ability to handle your personal problems?	1	2	3	4	5
Felt that things were going your way?	1	2	3	4	5
Found that you could not cope?	1	2	3	4	5
Been able to control irritations in your life?	1	2	3	4	5
Felt you were on top of things?	1	2	3	4	5
Been angered because of things that happened that were outside of your control?	1	2	3	4	5
Felt difficulties were piling up so high that you could not overcome them?	1	2	3	4	5
Felt "burned out" from your job	1	2	3	4	5
Felt fatigued when you got up in the morning and had to face another day on the job	1	2	3	4	5

27. All things considered, how would you rate your own physical health?

EXCELLENT		AVERAGE		POOR
1	2	3	4	5

28. To what extent do you agree or disagree with each of the following statements

	STRONGLY DISAGREE		NEUTRAL		STRONGLY AGREE
I feel I have more to do than I can comfortably handle	1	2	3	4	5
I feel physically drained when I get home from work	1	2	3	4	5
I feel emotionally drained when I get home from work	1	2	3	4	5
I feel I have to rush to get everything done each day	1	2	3	4	5
I feel I don't have enough time for myself	1	2	3	4	5
I have a good balance between my job and my family	1	2	3	4	5
My time off work does not match other family members' schedules well	1	2	3	4	5
My job keeps me away from my family too much	1	2	3	4	5

29. In the last 3 months, how many times have you seen a physician (Not counting regular and maternity-related check-ups)? _____TIMES

30. In the last 3 months, how many days have you:

Been unable to work or carry out your usual activities because of health problems?
_____DAYS

Been unable to work or carry out your usual activities because of family-related problems (i.e., sick child, elder care problem)? _____DAYS

Taken a day off because you were emotionally, physically or mentally fatigued?
_____DAYS

Missed time during a work day (e.g., arrived late, left early, left and returned) due to personal/family responsibilities? _____TIMES _____HOURS MISSED

31. How frequently do you use the following strategies to cope with stress?

	NEVER		SOMETIMES		ALWAYS
I talk things over with my spouse/partner	1	2	3	4	5
I talk things over with my friends	1	2	3	4	5
I talk things over with my colleagues at work	1	2	3	4	5
I talk things over with my manager	1	2	3	4	5
I get help from my co-workers	1	2	3	4	5
I get help from my manager	1	2	3	4	5
I get help from my family	1	2	3	4	5
I work harder (I try and do it all)	1	2	3	4	5
I prioritize	1	2	3	4	5
I delegate work to others	1	2	3	4	5
I seek professional help (counsellor, clergy, etc)	1	2	3	4	5
Other (please specify)_____	1	2	3	4	5

SECTION VII: INFORMATION ABOUT YOU

We need some information about you to help us interpret this questionnaire. To answer the following questions, please **CIRCLE** the letter of the answer which best describes you and/or **FILL IN** the information requested. **Please be assured that your responses will be held in confidence by the researchers.**

32. What is your gender?

- A. Male
- B. Female

33. What is your age? _____ YEARS

34. What is your present marital status? (**CIRCLE** all that apply)

- A. Never married
- B. Married or living with a significant other
- C. Divorced
- D. Separated
- E. Widowed

35. How many children do you have? _____ CHILDREN

(if zero Please skip to question 37)

36. We are interested in how old your children are. Please fill in the relevant information below.

Child# 1 _____ YEARS OLD

Child# 4 _____ YEARS OLD

Child# 2 _____ YEARS OLD

Child# 5 _____ YEARS OLD

Child# 3 _____ YEARS OLD

Child# 6 _____ YEARS OLD

37. Please indicate the **number of elderly dependents** in each of the following categories.

Living in your home _____

Living elsewhere _____

38. Please **CIRCLE** the letter which **BEST** describes your educational background:

- A. Some high school
- B. High school diploma
- C. Some college/some university
- D. College diploma
- E. University degree
- F. Post-graduate degree

39. Please **CIRCLE** the category which **BEST** describes:

**YOUR INCOME
BEFORE TAXES**

1. Less than \$19,999
2. \$20,000 to \$39,999
3. \$40,000 to \$59,999
4. \$60,000 to \$79,999
5. \$80,000 to \$99,999
6. More than \$100,000

**YOUR TOTAL FAMILY INCOME
BEFORE TAXES**

1. Less than \$19,999
2. \$20,000 to \$39,999
3. \$40,000 to \$59,999
4. \$60,000 to \$79,999
5. \$80,000 to \$99,999
6. \$100,000 to \$149,999
7. More than \$150,000

40. How long have you worked for the company you are currently with? _____ YEARS

41. How long have you had your present job? _____ MONTHS

42. How long have you worked for your present manager? _____ MONTHS

43. Is your present manager an owner of the company you are currently with?

- A. NO
- B. YES

44. Do you use a computer regularly in your work?

A. No

B. Yes → I use a computer for approximately _____ HOURS PER DAY

→ I use a computer to _____

45. Who handles human resource management issues within your company?

- A. Company owner(s)
- B. Your immediate manager
- C. A manager has been given responsibility for this function
- D. Human resources department
- E. No one officially manages this function
- F. Other (Please Specify) _____

46. Is your company unionized?

- A. NO
- B. YES

47. Please **CIRCLE** the letter which **best** fits most of the work:

YOU DO

- A. Managerial
- B. Professional
- C. Technical
- D. Administrative
- E. Clerical
- F. Retail
- G. Production
- H. Other _____

YOUR SIGNIFICANT OTHER DOES

- A. No partner
- B. Managerial
- C. Professional
- D. Technical
- E. Administrative
- F. Clerical
- G. Retail
- H. Production
- I. Homemaker
- J. Other _____

48. Do you supervise the work of other?

- A. NO
- B. YES → I have _____ DIRECT REPORTS

49. At present, approximately how many **hours per week** do you spend:

- In paid employment overall _____ HOURS/WEEK
- Working at home during regular hours _____ HOURS/WEEK
- Working at home outside regular hours _____ HOURS/WEEK
- In home chores and errands _____ HOURS/WEEK
- In childcare or activities with your children _____ HOURS/WEEK
- In self-related activities _____ HOURS/WEEK
(e.g. activities alone, with partner, or with friends)
- In volunteer activities _____ HOURS/WEEK
- Caring for elderly dependents _____ HOURS/WEEK

50. Approximately how many hours/week does **your significant other** spend in paid employment? _____ HOURS/WEEK N/A

Would you be willing to be interviewed in order to contribute to a better understanding of human resource issues in small businesses? If so, please fill in your first name and telephone number.

FIRST NAME _____

TELEPHONE: (____) _____

Thank you for completing this questionnaire.

Please be assured that your responses will be held in confidence by the researchers. Only aggregate responses will be reported.

Dr. Chris Higgins

(519) 661-3269

Dr. Linda Duxbury

(613) 520-2385

**Appendix III - CHI-SQUARE TEST OF RELIANCE ON COMPUTER
V.S. MODERATING VARIABLE**

A3.1 - Owners' Computer Use V.S. Company Growth

Growth		Use a computer regularly in work		Total
		No	Yes	
Increase	Count	6	33	39
	% of growth	15.4%	84.6%	100.0%
Stay the same/ decrease	Count	24	30	54
	% of growth	44.4%	55.6%	100.0%
Total	Count	30	63	93
	% of Total	32.3%	67.7%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.751	1	.003

A3.2 - Owners' Computer Use V.S. Owner's Confident Toward Their Ability in Implementing Technology

Confident		Use a computer regularly in work		Total
		No	Yes	
Not / moderately confident	Count	24	21	45
	% of confident	53.3%	46.7%	100.0%
Confident	Count	6	42	48
	% of confident	12.5%	87.5%	100.0%
Total	Count	30	63	93
	% of Total	32.3%	67.7%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.722	1	.000

A3.3 - Employees' Computer Use V.S. Job Type

Job type		Use computer regularly in work		Total
		No	Yes	
Managerial/professional	Count	51	236	287
	% of job type	17.8%	82.2%	100.0%
Technical/production	Count	129	149	278
	% of job type	46.4%	53.6%	100.0%
Clerical/administrative/retail	Count	39	175	214
	% of job type	18.2%	81.8%	100.0%
Total	Count	219	560	779
	% of Total	28.1%	71.9%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	71.563	2	.000

A3.4 - Employees' Computer Use V.S. Company Size

Size		Use computer regularly in work		Total
		No	Yes	
Small	Count	49	158	207
	% of size	23.7%	76.3%	100.0%
Large	Count	194	414	608
	% of size	31.9%	68.1%	100.0%
Total	Count	243	572	815
	% of Total	29.8%	70.2%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.006	1	.025

A3.5 - Employees' COMPUTER USE V.S. Industry Sector

Industry sectors		Use computer regularly in work		Total
		No	Yes	
Consulting	Count	20	126	146
	% of sectors	13.7%	86.3%	100.0%
Manufacturing	Count	36	108	144
	% of sectors	25.0%	75.0%	100.0%
High technology	Count	3	104	107
	% of sectors	2.8%	97.2%	100.0%
Other	Count	184	234	418
	% of sectors	44.0%	56.0%	100.0%
Total	Count	243	572	815
	% of Total	29.8%	70.2%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	97.325	3	.000

A3.6 - Employees' COMPUTER USE V.S Company Growth

Growth		Use computer regularly in work		Total
		No	Yes	
Increased	Count	105	304	409
	% of growth	25.7%	74.3%	100.0%
Stay the same/decrease	Count	138	268	406
	% of growth	34.0%	66.0%	100.0%
Total	Count	243	572	815
	% of Total	29.8%	70.2%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.736	1	.009

**Appendix IV -CHI-SQUARE TEST OF COMPUTER APPLICATIONS
USES V.S. MODERATING VARIABLE**

A4.1 - Word Processing Application V.S. Job Type

Job Type		Use computer for word processing		Total
		No	Yes	
Managerial/professional	Count	25	211	236
	% of job type	10.6%	89.4%	100.0%
Technical/production	Count	40	109	149
	% of job type	26.8%	73.2%	100.0%
Clerical/administrative/retail	Count	43	132	175
	% of job type	24.6%	75.4%	100.0%
Total	Count	108	452	560
	% of Total	19.3%	80.7%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.067	2	.000

A4.2 - Spreadsheet Application V.S. Job Type

Job Type		Use computer for spreadsheet		Total
		No	Yes	
Managerial/professional	Count	73	163	236
	% of job type	30.9%	69.1%	100.0%
Technical/production	Count	77	72	149
	% of job type	51.7%	48.3%	100.0%
Clerical/administrative/retail	Count	78	97	175
	% of job type	44.6%	55.4%	100.0%
Total	Count	228	332	560
	% of Total	40.7%	59.3%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.854	2	.000

A4.3 - CAD/CAM Application V.S. Job Type

Job Type		Use computer for CAD/CAM		Total
		No	Yes	
Managerial/professional	Count	211	25	236
	% of job type	89.4%	10.6%	100.0%
Technical/production	Count	128	21	149
	% of job type	85.9%	14.1%	100.0%
Clerical/administrative/retail	Count	170	5	175
	% of job type	97.1%	2.9%	100.0%
Total	Count	509	51	560
	% of Total	90.9%	9.1%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.364	2	.001

A4.4 - Internet V.S. Job Type

Job Type		Use computer for Internet		Total
		No	Yes	
Managerial/professional	Count	83	153	236
	% of job type	35.2%	64.8%	100.0%
Technical/production	Count	80	69	149
	% of job type	53.7%	46.3%	100.0%
Clerical/administrative/retail	Count	114	61	175
	% of job type	65.1%	34.9%	100.0%
Total	Count	277	283	560
	% of Total	49.5%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.566	2	.000

A4.5 - EMAIL V.S. Job Type

Job Type		Use computer for Email		Total
		No	Yes	
Managerial/professional	Count	59	177	236
	% of job type	25.0%	75.0%	100.0%
Technical/production	Count	60	89	149
	% of job type	40.3%	59.7%	100.0%
Clerical/administrative/retail	Count	79	96	175
	% of job type	45.1%	54.9%	100.0%
Total	Count	198	362	560
	% of Total	35.4%	64.6%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.981	2	.000

A4.6 - Internet V.S. Open to Technology

Open to Technology		Use computer for Internet use		Total
		No	Yes	
Neutral / not agree	Count	113	86	199
	% of open to technology	56.8%	43.2%	100.0%
Agree	Count	170	203	373
	% of open to technology	45.6%	54.4%	100.0%
Total	Count	283	289	572
	% of Total	49.5%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.521	1	.011

A4.7 - Email V.S. Open to Technology

Open to Technology		Use computer for Email		Total
		No	Yes	
Neutral / not agree	Count	83	116	199
	% of open to technology	41.7%	58.3%	100.0%
Agree	Count	122	251	373
	% of open to technology	32.7%	67.3%	100.0%
Total	Count	205	367	572
	% of Total	35.8%	64.2%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.572	1	.033

A4.8 - Word Processing Application V.S. Industry Sector

Sector		Use computer for word processing		Total
		No	Yes	
Consulting	Count	25	101	126
	% of sector	19.8%	80.2%	100.0%
Manufacturing	Count	24	84	108
	% of sector	22.2%	77.8%	100.0%
High technology	Count	5	99	104
	% of sector	4.8%	95.2%	100.0%
Other	Count	61	173	234
	% of sector	26.1%	73.9%	100.0%
Total	Count	115	457	572
	% of Total	20.1%	79.9%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.638	3	.000

A4.9 - Database Application V.S. Industry Sector

Sector		Use computer for Database		Total
		No	Yes	
Consulting	Count	42	84	126
	% of sector	33.3%	66.7%	100.0%
Manufacturing	Count	47	61	108
	% of sector	43.5%	56.5%	100.0%
High technology	Count	20	84	104
	% of sector	19.2%	80.8%	100.0%
Other	Count	119	115	234
	% of sector	50.9%	49.1%	100.0%
Total	Count	228	344	572
	% of Total	39.9%	60.1%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.105	3	.000

A4.10 -CAD/CAM Application V.S. Industry Sector

Sector		Use computer for CAD/CAM		Total
		No	Yes	
Consulting	Count	115	11	126
	% of sector	91.3%	8.7%	100.0%
Manufacturing	Count	96	12	108
	% of sector	88.9%	11.1%	100.0%
High technology	Count	82	22	104
	% of sector	78.8%	21.2%	100.0%
Other	Count	227	7	234
	% of sector	97.0%	3.0%	100.0%
Total	Count	520	52	572
	% of Total	90.9%	9.1%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.398	3	.000

A4.11 -Internet V.S. Industry Sector

Sector		Use computer for Internet		Total
		No	Yes	
Consulting	Count	66	60	126
	% of sector	52.4%	47.6%	100.0%
Manufacturing	Count	60	48	108
	% of sector	55.6%	44.4%	100.0%
High technology	Count	15	89	104
	% of sector	14.4%	85.6%	100.0%
Other	Count	142	92	234
	% of sector	60.7%	39.3%	100.0%
Total	Count	283	289	572
	% of Total	49.5%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	64.901	3	.000

A4.12 - Email V.S. Industry Sector

Sector		Use computer for Email		Total
		No	Yes	
Consulting	Count	35	91	126
	% of sector	27.8%	72.2%	100.0%
Manufacturing	Count	47	61	108
	% of sector	43.5%	56.5%	100.0%
High technology	Count	10	94	104
	% of sector	9.6%	90.4%	100.0%
Other	Count	113	121	234
	% of sector	48.3%	51.7%	100.0%
Total	Count	205	367	572
	% of Total	35.8%	64.2%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.210	3	.000

A4.13 -Word Processing Application V.S. Company Size

Size		Use computer for word processing		Total
		No	Yes	
Small	Count	21	137	158
	% of size	13.3%	86.7%	100.0%
Large	Count	94	320	414
	% of size	22.7%	77.3%	100.0%
Total	Count	115	457	572
	% of Total	20.1%	79.9%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.310	1	.012

A4.14 -CAD/CAM Application V.S. Company Size

Size		Use computer for CAD/CAM		Total
		No	Yes	
Small	Count	151	7	158
	% of size	95.6%	4.4%	100.0%
Large	Count	369	45	414
	% of size	89.1%	10.9%	100.0%
Total	Count	520	52	572
	% of Total	90.9%	9.1%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.737	1	.017

A4.15 -Internet V.S. Company Size

Size		Use computer for Internet		Total
		No	Yes	
Small	Count	58	100	158
	% of size	36.7%	63.3%	100.0%
Large	Count	225	189	414
	% of size	54.3%	45.7%	100.0%
Total	Count	283	289	572
	% of Total	49.5%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.234	1	.000

A4.16 -Email V.S. Company Size

Size		Use computer for Email		Total
		No	Yes	
Small	Count	45	113	158
	% of size	28.5%	71.5%	100.0%
Large	Count	160	254	414
	% of size	38.6%	61.4%	100.0%
Total	Count	205	367	572
	% of Total	35.8%	64.2%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.140	1	.023

A4.17 -CAD/CAM Application V.S. Company Growth

Grwoth		Use computer for CAD/CAM		Total
		No	Yes	
Increased	Count	264	40	304
	% of growth	86.8%	13.2%	100.0%
Stay the same/decrease	Count	256	12	268
	% of growth	95.5%	4.5%	100.0%
Total	Count	520	52	572
	% of Total	90.9%	9.1%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.986	1	.000

A4.18 -Internet V.S. Company Growth

Grwoth		Use computer for Internet		Total
		No	Yes	
Increased	Count	133	171	304
	% of growth	43.8%	56.3%	100.0%
Stay the same/decrease	Count	150	118	268
	% of growth	56.0%	44.0%	100.0%
Total	Count	283	289	572
	% of Total	49.5%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.509	1	.004

**Appendix V - CHI-SQUARE TEST OF APPLICATION
SOPHISTICATION V.S. MODERATING VARIABLE**

A5.1 - Application Sophistication V.S. Job Type

Job Type		Application Sophistication			Total
		Low	Medium	High	
Managerial/professional	Count	25	78	133	236
	% of job type	10.6%	33.1%	56.4%	100.0%
Technical/production	Count	12	39	98	149
	% of job type	8.1%	26.2%	65.8%	100.0%
Clerical/administrative/retail	Count	22	68	85	175
	% of job type	12.6%	38.9%	48.6%	100.0%
Total	Count	59	185	316	560
	% of Total	10.5%	33.0%	56.4%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.699	4	.046

A5.2 - Application Sophistication V.S. Industry Sector

Sector		Application Sophistication			Total
		Low	Medium	High	
Consulting	Count	13	38	75	126
	% of sector	10.3%	30.2%	59.5%	100.0%
Manufacturing	Count	7	32	69	108
	% of sector	6.5%	29.6%	63.9%	100.0%
High technology	Count	5	39	60	104
	% of sector	4.8%	37.5%	57.7%	100.0%
Other	Count	37	79	118	234
	% of sector	15.8%	33.8%	50.4%	100.0%
Total	Count	62	188	322	572
	% of Total	10.8%	32.9%	56.3%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.921	6	.021

**Appendix VI - CHI-SQUARE TEST OF COMMUNICATION
SOPHISTICATION V.S. MODERATING VARIABLE**

A6.1 - Communication Sophistication V.S. Job Type

Job Type		Communication Sophistication			Total
		Low	Medium	High	
Managerial/professional	Count	55	28	153	236
	% of job type	23.3%	11.9%	64.8%	100.0%
Technical/production	Count	58	22	69	149
	% of job type	38.9%	14.8%	46.3%	100.0%
Clerical/administrative/retail	Count	76	38	61	175
	% of job type	43.4%	21.7%	34.9%	100.0%
Total	Count	189	88	283	560
	% of Total	33.8%	15.7%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.571	4	.000

A6.2 - Communication Sophistication V.S. Open to Technology

Open to technology		Communication Sophistication			Total
		Low	Medium	High	
Neutral / not agree	Count	80	33	86	199
	% of open to technology	40.2%	16.6%	43.2%	100.0%
Agree	Count	114	56	203	373
	% of open to technology	30.6%	15.0%	54.4%	100.0%
Total	Count	194	89	289	572
	% of Total	33.9%	15.6%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.986	2	.030

A6.3 - Communication Sophistication V.S. Company Size

Size		Communication Sophistication			Total
		Low	Medium	High	
Small	Count	42	16	100	158
	% of size	26.6%	10.1%	63.3%	100.0%
Large	Count	152	73	189	414
	% of size	36.7%	17.6%	45.7%	100.0%
Total	Count	194	89	289	572
	% of Total	33.9%	15.6%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.645	2	.001

A6.4 - Communication Sophistication V.S. Industry Sector

Sector		Communication Sophistication			Total
		Low	Medium	High	
Consulting	Count	34	32	60	126
	% of sector	27.0%	25.4%	47.6%	100.0%
Manufacturing	Count	46	14	48	108
	% of sector	42.6%	13.0%	44.4%	100.0%
High technology	Count	7	8	89	104
	% of sector	6.7%	7.7%	85.6%	100.0%
Other	Count	107	35	92	234
	% of sector	45.7%	15.0%	39.3%	100.0%
Total	Count	194	89	289	572
	% of Total	33.9%	15.6%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	81.074	6	.000

A6.5 - Communication Sophistication V.S. Company Growth

Growth		Communication Sophistication			Total
		Low	Medium	High	
Increased	Count	94	39	171	304
	% of growth	30.9%	12.8%	56.3%	100.0%
Stay the same/decrease	Count	100	50	118	268
	% of growth	37.3%	18.7%	44.0%	100.0%
Total	Count	194	89	289	572
	% of Total	33.9%	15.6%	50.5%	100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.035	2	.011