INFORMATION SYSTEMS EFFECTIVENESS AMONG SMALL BUSINESSES

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"Aurrera begiratzen ez duena, atzean dago"
(Basque proverb)

[Those who don't look forward, stay behind]

To my family for everything forever. Because they always look forward and struggle, and they never give up.

To my parents, Javier and Blanca, for being always there, for their infinite understanding, unconditional support, and encouragement. To my brother, Iñigo, for being a friend, for all our conversations, and for helping me keep my roots. To my twin sister, María, for helping me always, for encouraging me to explore, and for being original.

Abstract

This study examines the validity of the Thong et al. (1996) model of Information Systems effectiveness in Canadian small businesses. The model evaluates the importance of managerial support and external expertise (vendors and consultants) for Information Systems effectiveness. This project extends the model by adding two constructs: intention of expansion for adopters and intention of adoption for non-adopters. The sample included 105 adopters and eight non-adopters of a mid-size city in Western Canada. Partial Least Squares was used to statistically test the model. The results showed that managerial and vendor support are essential for effective Information Systems in small businesses, and supported part of the relations between Information Systems effectiveness and intention of expansion for adopters. Descriptive statistics revealed that non-adopters lacked knowledge and resources to purchase technology. Overall, the results suggested managers should engage quality vendors to obtain Information Systems that contribute to achieve the small businesses' goals.

To Sarah Howe and Cindy Tollestrup because they have always been willing to help, been patient and been supportive.

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Chapter 1. Introduction

As an economy based on knowledge emerges, information is essential for any ongoing organization (Pugsley, Wright, Diochon, & Hunter, 2000). The globalization of products, services, markets, and competition has increased the need for flexibility, quality, cost-effectiveness, and timeliness (Hunter, Diochon, Pugsley, & Wright, 2002). A key resource for attaining these requirements is Information Systems (IS) (Hunter et al., 2002). Consequently, IS have revolutionized business practices (Hunter et al., 2002) and have become a major technological innovation during the last half of the twentieth century (Thong, 2001).

This study resides in the general stream of IS success. In the past decade, research on this topic has mainly attempted to provide a conceptualization and a theoretical framework for the notion of IS success (e.g., DeLone & MacLean, 1992; Seddon, 1997). Researchers acknowledged the necessity for well-defined variables that explain IS success (DeLone & McLean, 1992). Currently, the concept of IS success is widely accepted as the main criterion for evaluating IS, but researchers are still wrestling with the problem of which constructs influence IS success the most (Rai, Lang, & Welker, 2002). The problem lies in the complexity and multiplicity of constructs within IS research (Rai et al., 2002).

One of the topics that contributes to the conceptualization of IS success is IS effectiveness. Thus, this project investigates IS effectiveness among small businesses. Two widely known models of IS success, DeLone and McLean's (1992) model and Seddon's (1997) revision of the former model, use IS effectiveness as a surrogate of IS success and, therefore, as a main component of their respective models. Both models

integrate and interrelate multiple dimensions of IS success. In the case of Seddon's

(1997) respecified version of DeLone and McLean's (1992) model, IS success is a

dependent variable formed by three subcategories: measures of information and system

quality (e.g., system quality), general perceptual measures of net benefits of IS use (e.g.,

user satisfaction), and other measures of net benefits of IS use (e.g., net benefits to

organizations).

Another main topic of IS research is the strategic role of IS among organizations

(e.g., Chan, Huff, Barclay, & Copeland, 1997; Sabherwal & Chan, 2001). Previous

research has found that in the last fifteen years, IS has transcended its traditional role as

support for administrative activities and now plays a more central part of business

strategies (Keen, 1991). As such, IS is now approached as a means for gaining

competitive advantages in the strategy of a firm (Pollard & Hayne, 1998). According to

Pollard and Hayne (1998), this concept applies to both small and large enterprises;

however, small businesses face different challenges than large businesses and this may

influence their use of IS.

Small businesses have unique characteristics and, in fact, researchers have found

firm size is directly associated with IS success (DeLone 1981; Duxbury, Decady & Tse,

2002; Ein-Dor & Segev, 1978; Raymond, 1985). Therefore, results regarding large

business IS[1] environment may not apply to small businesses (Ein-Dor & Segev, 1978;

Raymond, 1985). Furthermore, much of the research on this topic has attempted to

confirm findings from research conducted in large firms (e.g., Cragg & King, 1993).

Stevenson (1999), El Louadi (1998), Pollard and Hayne (1998), and Burgess (2002)

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[1] Information Systems (IS) and Management Information System (MIS) in this study are viewed the same.

suggest that there is a need to conduct additional IS research within the specific

framework of small businesses. The rest of the chapter expands the motivation for

research on small businesses and IS and introduces the research questions for this study.

Unique Characteristics of Small Businesses

To fully understand the rationale for conducting different research projects for small and

large businesses, it is important to describe the main characteristics that distinguish

organizations of different sizes.

Using the organization as the level of analysis, Stevenson (1999) stated that

generally, managers in small businesses are more oriented toward a "promoter" role,

while the managers of large businesses tend to take a "trustee" orientation. From a

strategic point of view, the "promoter" or small business manager usually responds to

opportunities within a very short time frame (Hunter & Long, 2002b). On the other hand,

the "trustee" or large business manager normally turns his/her attention to the efficient

use of current resources in order to determine the greatest return considering the long-

term implications (Hunter & Long, 2002b). Therefore, small organizations commit their

resources for shorter periods of time and at different points in time (Stevenson, 1999). In

an environment that is complex and ever changing, this type of commitment enables

organizations to respond more quickly to changes. Hence, small businesses are flexible

organizations that facilitate rapid and accurate assessments of their environments in order

to respond with the goal of gaining opportunities (El Louadi, 1998). This leads to an

absence of formal planning in the decision-making context of small firms (Lefebvre &

Lefebvre, 1988).

Furthermore, the concept of "resource poverty "(Welsh & White, 1981; Thong, Yap, & Raman, 1994) provides more explanations for the differences between large and small businesses. According to Thong et al. (1994), resource poverty refers to the lack of financial and human resources. Malone (1985) stated that small businesses do not seem to embrace Information Technology (IT) because they lack financial and human resources needed for IT implementation. Based on this resource poverty notion, Hunter and Long (2002a) also stressed that while managers of large organizations have a much greater amount of available resources, managers of small businesses have limited financial and human resources. Due to these differences in resources, large and small business managers manage their organizations differently (Hunter & Long, 2002b). Thus, the lack of financial resources forces small firms to make minimal commitments, that are often spread out at different moments of time (Hunter & Long, 2002b). In addition, Hunter et al. (2002) found that the use of IS depends on a long-term plan and on a large on-time commitment of both financial and human resources. Therefore, the use of IS does not match a multi-time commitment process. This situation represents a dilemma to the manager of small organizations (Hunter et al., 2002).

As Pollard and Hayne (1998) stressed, small firms still do not have the resources to make significant mistakes, and as a result they are very concerned about adopting technology that can directly impact the financial survival of their businesses. Therefore, although the cost of technology has decreased significantly during the past decade, it still remains an important investment for small business (Pollard & Hayne, 1998). Furthermore and within a broader scope, small businesses are considered to be riskier (Walker, 1975) and subject to higher failure rates than large businesses (Cochran, 1981).

More specifically, from an IS perspective, another difference between small and large organizations is the interaction between the businesses and the stakeholders involved in their use of IS (Hunter et al., 2002). According to Hunter et al. (2002), the first stakeholder is obviously the manager, while the second stakeholder is the consultant. The consultant is not completely aware of the different implications in the practices between small and large firms (Hunter et al., 2002). Another stakeholder is the vendor, who provides hardware and software to small businesses (Hunter al., 2002). Large organizations purchase machines and applications on a large scale, whereas small organizations tend to buy a unique product from time to time. This is again related to the multi-time commitment process that small businesses face. Based on Hunter et al., (2002) vendors should develop solutions focusing on the uniqueness of small businesses. The last stakeholder is the government (Hunter et al., 2002). If the government encourages the growth of small businesses and the use of IS, it cannot ignore the financial constraints that small businesses face. Each of these stakeholders must be aware of the unique characteristics and problems of small business in order to help these businesses in their development and growth of IS (Hunter et al., 2002).

The relationship between businesses and the stakeholders who play a role in the implementation of IS helps to explain why the environment is perceived differently in large and small businesses. Thus, whereas small business greatly depends on its environment, large organizations are more powerful and, therefore, more able to control their relations with the environment (El Louadi, 1998).

In summary, small and large businesses have different characteristics. First, while the manager of a small business attempts to generate profit and gain opportunities in a

very short period of time, the large business manager focuses his/her efforts on the most efficient use of resources in order to maximize profits over the long term. Second, resource poverty has different implications for small and large businesses; large businesses employ a larger amount of available resources than small businesses do. Finally, small and large businesses interact differently with the stakeholders involved in their use of IS. These stakeholders include managers, vendors, consultants, and the government. Consequently, the unique characteristics of small businesses often shape their behavior with respect to IS.

Nature of the Study

This section introduces the theoretical background for the research project. At the end of the section, the research questions for the study are stated.

Theoretical Basis for Research

The basis for this project is the Thong, Yap and Raman (1996) model of IS effectiveness among Singaporean small businesses. IS effectiveness refers to the IS contribution in the achievement of organizational goals (Raymond, 1990).There are two main reasons for choosing the Thong et al. (1996) study for the basis of this research project. First, the Thong et al. (1996) study cumulates some of the factors identified by the literature as affecting the IS effectiveness of small businesses. These factors include managerial support (e.g., DeLone, 1988; Igbaria, Zinatelli, Cragg, & Cavaye, 1997) and external IS expertise (e.g., Thong, 2001; Thong et al., 1994; Yap, Soh, & Raman, 1992). The Thong et al. (1996) model tests the influence of managerial support and external IS expertise on IS effectiveness. Second, the Thong et al. (1996) model has not been tested

within a Canadian environment. Thus, the examination of the Thong et al. (1996) model in Canada will give us a better understanding of the situation of IS in Canadian small businesses, as well as the identification of potential factors that encourage IS effectiveness in Canada, and the generalizability of the Thong et al. (1996) model.

This research is also based on Attewell's (1992) theory of technology diffusion, which was also the basis of the Thong et al. (1996) model, and the resource-based theory of the firm (Prahalad & Hamel, 1990; Wernerfelt, 1984). According to Attewell (1992), companies face a lack of knowledge regarding IS implementation that can be overcome by the support of external experts. Furthermore, the resource-based theory of the firm (Prahalad & Hamel, 1990; Wernefelt, 1984) states that businesses are collections of resources. As explained previously, small businesses face greater resource constraints when compared with large organizations (Hunter et al., 2002). However, managers of small businesses have the power to commit resources toward the implementation of IS (Thong, 1999; Thong, 2001). Therefore, combining the two theories, this research examines whether managerial support and external IS expertise are factors that may influence IS effectiveness in Canadian small businesses.

This research also attempts to expand the Thong et al. (1996) model by introducing two additional constructs: intention of IS expansion and intention of IS adoption. Harrison, Mykytyn and Riemenschneider (1997) define intention as the strength of specific plans toward the accomplishment of the target behavior. Intention of IS expansion refers to the plans for new IS implementation by those businesses that already use computer technology. Intention of IS adoption refers to the plans for IS adoption by those businesses that do not use computer technology. The Thong et

al.(1996) study did not include these two aspects, which are closely related to Attewell's (1992) theory of technology diffusion and the resource-based theory of the firm (Prahalad & Hamel, 1990; Wernerfelt, 1984). This research will also analyze whether managerial support, external IS expertise, and IS effectiveness are factors that may influence the intention of IS expansion and the intention of IS adoption among Canadian small businesses.

Objectives and Research Questions

This study has three main objectives. The first objective is to test the Thong et al. (1996) model of IS effectiveness in a Canadian small business environment. The second aim is to expand the Thong et al. (1996) model with the construct intention of IS expansion for those small businesses that have already adopted IS. The third objective is to add the construct intention of IS adoption to the Thong et al. (1996) model for those small businesses that do not use IS. Therefore, the following research questions are posed:

- o Is the Thong et al. (1996) model of IS effectiveness valid for small businesses in Canada?

- o Do the critical factors for intention of IS expansion among IS adopter small businesses in Canada include managerial support, external IS expertise, and IS effectiveness?

- o Do the critical factors for intention of IS adoption among IS non-adopter small businesses in Canada include managerial support and external IS expertise?

Research in Small Businesses and Information Systems

Examining small businesses from the point of view of IS research provides more motivation for conducting specific research on this type of business. According to Burgess (2002), a study conducted in March 2001 that reviewed articles regarding IT that appeared in the AB/Inform database[2] from 1986 to 1999, concluded that although the number of articles regarding IT and small businesses reached its highest level from 1997 to 1999, with 23 articles in 1999, these articles represent approximately two-thirds to one percent of the total number of articles in the area of IT (Burgess, 2002). The number of articles related to IT and small businesses has not increased at all when compared with those investigating IT in general (Burgess, 2002).

In addition, previous studies investigating this topic have attempted to generalize findings from research conducted in large firms to small businesses. For example, Cragg and King (1993) examined IS evolution in small businesses based on Nolan's (1973, 1979) growth stages model of computing developments over time in large firms. On the other hand and as stated earlier, several studies have confirmed that firm size influences IS success, and results within IS environments for large business may not necessarily be applicable to small businesses (DeLone, 1981; Duxbury et al., 2002; Ein-Dor & Segev, 1978; Kagan, Lau, & Nusgart, 1990). Burgess (2002) concluded that the use of computers increased as the size of businesses also increased, with 90% of the Australian businesses with three to nine employees using computers and reaching 100% for those businesses with more than 20 employees.

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[2] The AB/Inform database is a business article research reference tool.

Small Businesses in Canada

This section provides some information with respect to small businesses in Canada in two different ways. First, it provides some data to determine the importance of this sector for the economy of the country. Second, it describes the findings of a recent study on Canadian small businesses and IS.

Importance of Small Businesses in Canada

It is relevant to study small businesses with their own framework not only because of their unique characteristics, but also because of their importance to the economy of a country. The capacity of a country's economy to adapt to changing demands has been linked to and achieved by the flexibility and responsiveness of small business (Hunter & Long, 2002a). Furthermore, governments and economists view small firms as the mechanism by which national growth is created (Pollard & Hayne, 1998).

In 1997, Industry Canada reported that there were over 2.3 million small businesses with fewer than 100 employees, which accounted for over 50% of the private sector employment and for 43% of total economic output of the country (Hunter et al., 2002). One year later, the Canadian Federation of Independent Business estimated that between 84% and 87% of all Canadian businesses could be classified as small (Pollard & Hayne, 1998). These data demonstrate that small businesses are paramount for the prosperity of Canada.

Some Data Regarding Canadian Small Businesses and Information Systems

It is important to look at recent studies regarding IS and Canadian small businesses in order to get a sense of these firms, which are the central focus of this study.

Research on Canadian small businesses appears to be very scarce; the investigator could find only one recent empirical study on the topic.

Duxbury et al. (2002) conducted a study about the adoption and use of computer technology in 6,531 Canadian small businesses with fewer than 100 full-time paid employees. The small businesses were divided into three categories:

1. micro businesses, firms with two to nine employees

2. mid-sized businesses, organizations with 10 to 49 employees

3. larger small business, businesses with 50 to 99 employees

The study also compared these categories of small businesses to medium (100 to 500 full-time employees) and large (more than 500 employees) organizations.

With respect to IS use, Duxbury et al. (2002) reported that the amount of work per week performed with computers was directly associated with company size. In addition, application use was directly associated with company size. Hence, micro businesses made less use of spreadsheets, communications applications, graphics, and expert systems (Duxbury et al., 2002). This suggests that the use of computers by micro businesses is not as extensive as that in larger businesses. However, Duxbury et al. (2002) reported that all the firms, regardless of their size, relied heavily on word processing and office application packages. The next most used applications varied significantly with business size, with micro businesses utilizing database applications and firms with 10 or more employees using spreadsheet packages (Duxbury et al., 2002).

The main perceived barriers to the implementation of computer technologies were the lack of financial resources, lack of skilled personnel, lack of information on

technologies, and lack of information on markets (Duxbury et al., 2002). This is consistent with the notion of resource poverty of Thong et al. (1994) and Attewell's (1992) theory of technology diffusion.

With respect to adoption, the Duxbury et al. (2002) study indicated that approximately one in three Canadian firms had a major software or hardware implementation from April 1, 1998, to March 31, 1999. Furthermore, the research showed that the likelihood of having a major implementation was significantly associated again with business size, with larger small businesses and medium businesses being more likely to implement than micro businesses, mid-sized businesses or large organizations (Duxbury et al., 2002).

Contribution

It is possible that the Thong et al.(1996) model for IS effectiveness will be successfully tested among Canadian small businesses. This possible outcome will have consequences not only for future research, but also for practitioners. Thus, Canadian small business managers should be aware that to achieve a high level of IS effectiveness, they need to get involved in the implementation process as well as to direct more efforts in selecting and engaging qualified vendors and consultants. On the other hand, if the Thong et al. (1996) model does not apply to Canadian small businesses, future research should be conducted in order to understand the potential cultural reasons for the finding.

If the intention part of the study is successfully tested, the Thong et al. (1996) model would be expanded. In that case, vendors and consultants should focus their efforts on building a trustworthy reputation in order to transmit confidence to small businesses

and facilitate their expansion or adoption of IS. Moreover, future research should focus

on replicating this study in order to enhance the validity of the extended model.

Chapter 2. Literature Review

Theoretical Base for Research

The Thong et al.(1996) model stated that managerial support and external IS experts can overcome the lack of resources and knowledge that small businesses face in the implementation of IS and, therefore, influence the effectiveness of their IS (see Figure 1). The basis for the model is Attewell's (1992) theory of technology diffusion, which is explained in the following paragraphs.
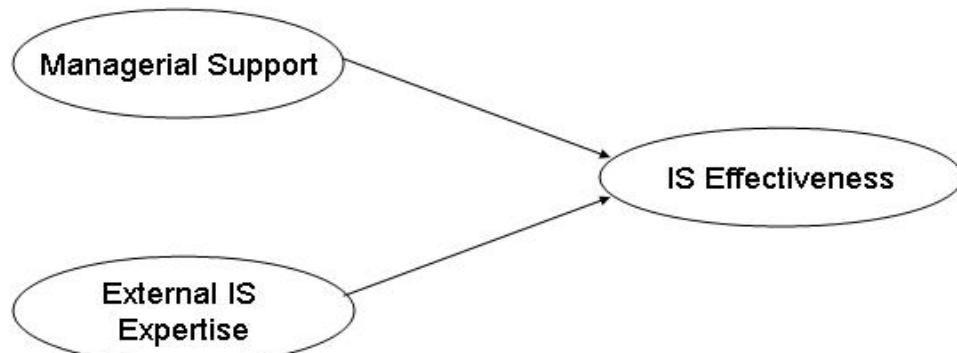
Figure 1. The Thong et al. (1996) Conceptual Model.

The research at hand is based on two theories. The first one is Attewell's (1992) theory of technology diffusion, which was also the basis for the Thong et al. (1996) study. The second theory is the resource-based theory of the firm (Prahalad & Hamel, 1990; Wernerfelt, 1984). The reason for including the resource-based theory of the firm is that Thong (2001) used it as the theoretical foundation for testing their model that included the three constructs depicted in Figure 1.

Attewell's (1992) theory of technology diffusion is based on a knowledge-barrier, institutional-network approach. It states that technical knowledge of adopters is immobile

and often has to be developed by the adopters themselves. Therefore, the task of developing technical knowledge becomes a critical issue among organizations (Attewell, 1992). Attewell (1992) theorized that businesses tend to delay technology adoption due to this lack of knowledge about how to implement and operate IS (Attewell, 1992). In these circumstances, mediating entities, such as consultants and IS vendors, play a paramount role in the diffusion of IS in businesses. Hence, the relationships between external experts, vendors and consultants, and adopter businesses goes beyond the simple actions of selling and buying equipment (Attewell, 1992), as is explained in the following paragraph.

External experts and businesses build structured relationships in order to reduce the knowledge barrier for potential adopters of new technology (Attewell, 1992). These relationships can be seen as a network of supplier and adopter businesses with technical knowledge distributed across the network (Attewell, 1992). The businesses provide the expertise in their areas of operations while the suppliers provide the knowledge about technical issues. Attewell (1992) claims that supplier institutions exist due to the fact that there is scarce knowledge within organizations about technical issues. Therefore, external experts specialize in creating technical know-how regarding technologies and place themselves between the adopter and the creators of that technology, referred to as "mediating" entities by Attewell (1992). According to Attewell (1992), mediating entities accumulate technical issues while they develop their projects, and use that knowledge in new implementations. Therefore, the fact that the number of adopters of technology increases over time does not have to be viewed only in terms of a reached equilibrium

between costs and profitability, but also in terms of overcoming barriers, such as knowledge, that adopters face (Attewell, 1992).

According to the resource-based theory of the firm (Prahalad & Hamel, 1990; Wernerfelt, 1984), businesses are characterized as collections of resources or capabilities. Resources include both tangible and intangible assets consisting of capabilities, organizational processes, information, and knowledge, controlled by the firm and enabling it to conceive and implement strategies that improve its efficiency and effectiveness (Barney, 1991). The value of a resource tends to be partially contingent upon the presence of other resources (Foss, Knudsen, & Montgomery, 1995). Closely related to resource-based theory is Welsh and White's (1981) framework of resource constraints in small business. According to this framework, the unique characteristics of small businesses are exemplified in the condition of resource poverty (Welsh & White, 1981). Thus, small businesses operate under severe time constraints, financial constraints, and expertise constraints (Thong et al., 1994). Time constraints are defined as the limited amount of time available for activities beyond the normal job responsibilities of individuals in the small business (Thong, 2001). Due to their limited time, managers and employees of small firms tend to have a short-term perspective with regard to IS implementation (Thong, 2001). Financial constraints refer to the limited amount of finances available for activities beyond the normal operations of small businesses (Thong, 2001). As a result, small businesses tend to control their cash flows carefully and do not have unlimited funds for IS implementation (Yap, 1989).

Thong (2001) defined expertise constraints are the limited amounts of expertise within the small business to carry out activities beyond designated job responsibilities.

Due to the lack of expertise, small businesses do not have the capability to undertake their own IS implementation and, therefore, external entities become a potential source of expertise for small businesses willing to implement IS (Thong, 2001). This is consistent with Attewell's (1992) theory of technology diffusion.

Therefore, taking technology diffusion and resource-based theory into consideration, the conceptual model for this study (see Figure 2), theorizes that managerial support and external IS expertise are factors that can alleviate the knowledge barrier and resource poverty that small businesses face in their use and implementation of IS. Thus, the Thong et al. (1996) model states that managerial support and external IS expertise are directly associated with IS effectiveness (see Figure 2).
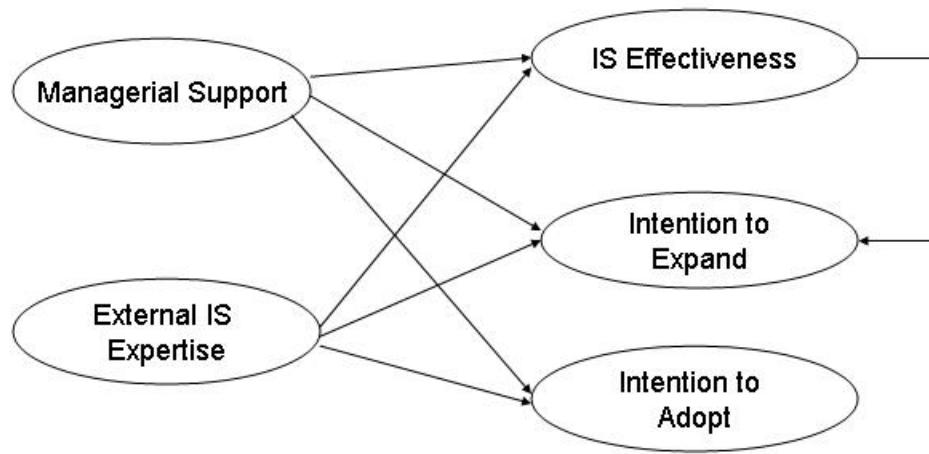
Figure 2. The Thong et al. (1996) Model Expanded

In addition, the Thong et al. (1996) model has been expanded to include two additional constructs, intention of IS expansion and intention of IS adoption (see Figure 2). Both constructs are closely related with Attewell's (1992) theory of technology diffusion and the resource-based theory of the firm (Prahalad & Hamel, 1990; Wernerfelt,

1984). Hence, external experts and managerial support play an important role not only in the appropriate use of IS, but also in the intention to expand IS in those businesses that already use technology, and in the intention to adopt IS in those businesses where technology is not a reality (Attewell, 1992).

Antecedents

Managerial support

Although a manager is not the same as an owner, most small businesses have flat structures and are controlled by an owner who also acts as the manager (Yap et al., 1992). In this project, both terms are used interchangeably.

The importance of management support for IS effectiveness in small businesses has been recognized consistently in the IS literature (e.g., Cragg & King., 1993; DeLone, 1988; Igbaria et al., 1997; Thong, 1999, 2001; Thong et al., 1996; Yap et al., 1992). According to Yap (1989), there are two reasons why managers support IS implementation. First, managers are in the best position to identify business opportunities for the exploitation of IS (Yap, 1989). This is because managers are the ones who understand their business the best (Thong et al., 1996). Thus, managers can bring IS into alignment with corporate objectives and strategies (Jarvenpaa & Ives, 1991). Second, IS implementation requires a substantial investment and has an impact on the whole organization (Yap, 1989). Managers have the authority to ensure sufficient allocation of resources and create a more conductive environment for IS implementation (Lucas, 1981). In addition, management support encourages users to develop positive attitudes toward the use of IS and contributes to a smoother transition in the way work is achieved

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between nonuse and use of IS (Thong et al., 1996). Management support is also positively associated with perceived ease of use and perceived usefulness of IS within small businesses (Igbaria et al., 1997). Therefore, management commitment toward IS can make a difference between successful and unsuccessful IS implementation (Ginzberg, 1981).

There are many indicators of management support. According to Igbaria et al. (1997), management support includes the encouragement to use IS, the provision of a wide selection of user-friendly applications, the support for training programs, and the encouragement of experimentation. In addition, top management support can take the form of guidance in planning, design, development, and implementation activities (Bruwer, 1984). Other forms of management support include the development of written plans, the agreed upon development priorities, the development of project policies, and the provision of funding for long-term commitments (Doll, 1985).

Management support among small businesses seems to be informal with the absence of official committees, plans, and policies (Thong et al., 1996). Hence, the main duties of small businesses' managers are attending project meetings with consultants and vendors in order to specify the business requirements, clarifying of any concerns related to the implementation, and monitoring the implementation process (Thong et al., 1996).

External Information Systems expertise

Previous studies have identified a number of possible determinants of IS effectiveness among small businesses. One key factor critical to IS effectiveness is external IS expertise (Thong, 2001, Thong et al., 1994; Thong et al., 1996; Yap et al., 1992).

However, there seems to be a lack of recent empirical studies investigating consultant and vendor support among small businesses and, therefore, there is a need for current research on the topic. For instance, the key references of Bode and Burn's (2002) study of consultant engagement for e-business development in small businesses are Gable (1991) and Thong et al. (1996). Also, prior research that evaluates the engagement of external IS experts in small businesses has been mainly descriptive surveys (e.g., Garris & Burch, 1983; Heintz, 1981; Newpeck & Hallbauer, 1981; Senn & Gibson, 1981), and case studies (e.g., Gable, 1991; Kole, 1983).

Although the costs of computer technology have consistently declined and systems are becoming more user friendly (Cooley, Walz, & Walz, 1987), researchers have found time after time that most small businesses lack computer experience and do not have in-house technical experts (e.g., DeLone, 1981, 1988; Lees, 1987; Lees & Lees, 1987). This lack of internal IS expertise is due to the fact that small businesses do not provide the career advancement prospects that can be found in large organizations (Thong et al., 1996). Thus, external IS experts, consisting of consultants and vendors, have an important role to play in assisting small businesses with the successful implementation of IS (e.g., Cragg & King, 1993, Hunter et al., 2002; Thong, 1999, 2001; Thong et al., 1994, Thong et al., 1996; Yap et al., 1992). In addition, some studies have found that one of the barriers that small businesses experience with the effective implementation of IS is the lack of use of external consultants and vendors (e.g., Igbaria et al., 1997; Pollard & Hayne, 1998).

The importance of consultants in the IS implementation process among small businesses has been stressed by previous studies (e.g., Gable, 1991; Kole, 1983; Thong,

2001; Thong et al., 1994, Thong et al., 1996; Yap et al., 1992). The major responsibility of consultants is to help businesses implement effective IS (Thong et al., 1994). Consultancy services often involve the performance of the business information requirements analysis, the recommendation of suitable hardware and software solutions, and the management of IS implementation (Thong et al., 1994).

Vendors are classified as another source of external IS expertise (Thong, 2001; Thong et al., 1994, Thong et al., 1996). The importance of vendors in the implementation of IS in small businesses has been reported in previous studies (e.g., Farhoomand & Hrycyk, 1985; Garris & Burch, 1984; Thong et al., 1994; Thong et al., 1996; Yap et al., 1992). Generally, the primary duties of a vendor include the provision of computer hardware, software packages, technical support, and user training (Thong et al., 1994).

There are two main approaches that small businesses use to engage external experts (Thong et al., 1994). First, there is the consultant-vendor approach (Thong et al., 1994). In this approach, a small business hires a consultant to analyze the information requirements needed by the firm, and to assist with the implementation of the system. A separate vendor then, provides the hardware and the software required to implement the solution. Second, there is the vendor-only approach (Thong et al., 1994), where a vendor will complement the provision of hardware and software with consultancy services (Thong et al., 1994). On one hand, with the consultant-vendor approach, small businesses gain benefits by receiving advice from an impartial consultant who will assess the requirements of the business and independently recommend the best solution available in the market (Thong et al., 1994). However, small businesses utilizing this approach are more likely to finish the implementation over time and over budget (Soh, Yap, & Raman,

1992). On the other hand, the vendor-only approach may improve the communication and the coordination of the project (Thong et al., 1994). There is the possibility, however, that the vendor may recommend his/her own product without being the most suitable one for the business involved in the project. Many small businesses perceive the costs of external expertise as being prohibitive (Gable, 1991).

Finally, there appears to be a lack of understanding between external experts and small businesses (Thong et al., 1996). On one hand, it seems that consultants and vendors are not completely aware of the different implications in the practices between small and large firms (Hunter et al., 2002). According to McCollum (1999), this is because small businesses are often viewed by consultants as one-shot opportunities, and they do not provide the potential for creating a long-term relationship. On the other hand, small businesses tend to overestimate the impact of external IS experts in achieving effective IS implementation (Thong et al., 1996). Furthermore, the contracts between consultants and small businesses are not clear. Six of the ten small businesses studied by Bode and Burn (2002) did not have a formal written contract, and some of these did not even have a verbal agreement.

Dependent Variables

Information Systems effectiveness

IS effectiveness is one of the most common dependant variables in the MIS literature (e.g., DeLone & McLean, 1992; Seddon, 1997; Thong, 2001; Thong et al., 1994; Thong et al., 1996). According to Raymond (1990), IS effectiveness is the extent to which IS actually contributes to achieving organizational goals. Nevertheless, a consensus on the

definition and conceptualization of IS effectiveness appears not to exist among

constituents (DeLone & McLean, 1992). Approaches to measure IS effectiveness in

previous research include IS usage (Ein-Dor & Segev, 1978), user satisfaction (Bailey &

Pearson, 1983), incremental performance in decision-making effectiveness (King &

Rodriguez, 1978), cost-benefit analysis (King & Schrems, 1978), information economics

(Maish, 1979), utility analysis (Kleijnen, 1980), and information attribute examination

(Epstein & King, 1982). Furthermore, the complexity of the phenomenon includes

multiple dimensions (DeLone & McLean, 1992). Due to these different approaches, it is

unlikely that a single measure of IS effectiveness will emerge and, therefore, there is a

need for multiple measures (DeLone & McLean., 1992).

Although IS effectiveness has multiple dimensions, Srinivasan (1985) argues that

there are two main approaches for measuring this phenomenon. First, the IS usage

approach uses behavioral indicators as surrogates for IS effectiveness (Srinivasan, 1985).

These indicators include the number of reports generated and connect time for example

(Srinivasan, 1985). The second approach is the perceived effectiveness approach, which

uses measures of effectiveness as perceived by users of the system (Srinivasan, 1985).

These measures include indicators such as users' perceptions of satisfaction, and quality

(Srinivasan, 1985). However, the literature is replete with arguments for and against the

use of these two approaches (Srinivasan, 1985). Recent studies on IS effectiveness

models have mostly proposed measures of the perceived effectiveness approach (e.g.,

DeLone & McLean, 1992; Seddon, 1997).

In this study, the domain IS effectiveness is assessed using three perceived

effectiveness measurements: user satisfaction (e.g., Thong et al., 1996), organizational

impact (e.g., Thong, 2001; Thong et al., 1996), and over IS effectiveness (e.g., Thong et al., 1996). Overall IS effectiveness is included as it was used to complement IS effectiveness in the Thong et al. (1996) study, which is the basis for this project. DeLone and McLean's (1992) model of IS effectiveness includes both user satisfaction and organizational impact as appropriate surrogates for IS effectiveness. In addition, Seddon's (1997) revision of DeLone and McLean's (1992) model maintains these two measures as representative of IS effectiveness.

User satisfaction is the extent to which users believe that IS meets their information requirements (Ives, Olson, & Baroudi, 1983). Seddon and Kiew (1994), empirically supported that user satisfaction is the best 'omnibus' construct of IS success by testing it along with system quality, information quality, and usefulness. Furthermore, previous research states that user satisfaction provides the most useful assessment of IS success (Hamilton & Chervany, 1981).

Organizational impact refers to the impact of IS on the performance of the small business (Thong, 2001). Thus, IS is only effective when it adds value to organizational effectiveness (Thong et al., 1996).

Overall IS effectiveness is included to capture the participants' conceptualization of IS effectiveness (Thong et al., 1996). This conceptualization of IS effectiveness may vary from that of the investigator, and the measure attempts to capture the meaning that IS effectiveness has among the participants.

In this study, IS effectiveness is also treated as an antecedent of the intention of IS expansion. The rationale for this can be found in Attewell's (1992) theory of technology diffusion. According to Attewell (1992), businesses do not expand or adopt new IS

because they lack knowledge regarding this issue. However, as a business uses IS successfully and builds productive relationships with the external IS experts, the business starts a process of organizational learning regarding IS issues (Attewell, 1992). Therefore, when a business uses IS in an effective way, it realizes their benefits and the potential outcomes that future IS expansions can bring (Seddon, 1997). Hence, in this study IS effectiveness is a mediating variable that may influence the intention of IS expansion among small businesses.

Intention

Intention is defined as "the strength of conscious plans to perform the target behavior" (Harrison et al., 1997, p. 176). In this study, the target behavior refers to expansion of IS in those businesses that currently use computer technology, and to adoption of IS in those businesses that do not utilize computer technology.

Researchers have suggested that intention models or behavioral decision theories from social psychology may provide a foundation for research investigating IS adoption by businesses (Swanson, 1982). Fishbein and Ajzen's (1975) and Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA) and Ajzen's (1991) Theory of Planned Behavior (TPB) have been used in the IS literature to incorporate theoretical concepts and principles for predicting successful intentions of IS adoption (e.g. Harrison et al., 1997; Venkatesh & Brown, 2001).

However, this study uses Attewell's (1992) theory of technology diffusion to determine the predictors of intention of IS expansion and intention of IS adoption. This is because the TRA and TPB do not include the antecedents that are used in this study for

predicting intention. Therefore, Attewell's theory of technology diffusion emphasizes the role of external expertise in the potential adoption of IS.

Besides Attewell (1992), Kimberly and Evanisko (1981) identified three clusters of predictors of innovation adoption: characteristics of organizational leaders, characteristics of organizations, and characteristics of environmental context. This study focuses on the characteristics of organizational leaders and environmental contexts in order to predict intention. Relating this to Attewell's (1992) theory of technology diffusion, it is reasonable that the perception that small business managers get from the vendors and consultants, and managerial support, can compensate for businesses' lack of technical knowledge and resources. Therefore, this facilitate IS expansion or adoption among small businesses. Hence, it is reasonable to expand the Thong et al. (1996) model due to the close associations between technology diffusion and intention of IS adoption and expansion.

Research Model

As stated earlier, this study has three main research objectives. The first objective of the study is to examine the importance of top management support and external IS expertise in IS effectiveness among Canadian small businesses; that is, the testing of the Thong et al. (1996) model in a Canadian environment. The second aim of the study is to determine if managerial support, external IS expertise, and IS effectiveness are determinant factors for intention of IS expansion. The third goal is to examine if managerial support and external IS expertise are predictor factors of intention of IS adoption.

The first two objectives are relevant for IS adopter small business, while the last objective relates to IS non-adopter small business. Therefore, since there are two exclusive groups of small businesses in the study, two research models are presented with their respective hypotheses.

Research Model for Information Systems Adopter Small Businesses

Figure 3 describes the research model for small businesses that have adopted IS. In the following sections the hypotheses of this model are stated.
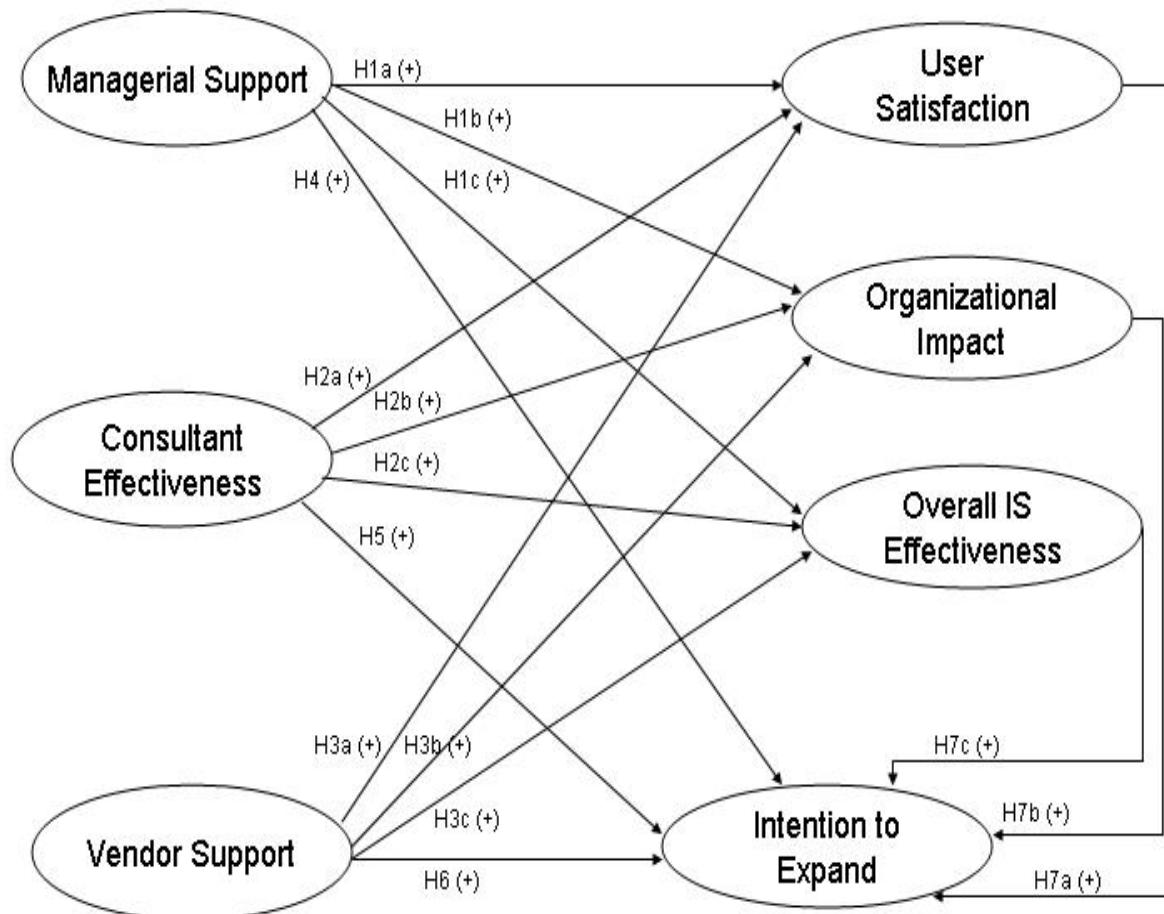
Figure 3. Research Model for Information Systems Adopter Small Businesses.

Managerial support and Information Systems effectiveness

When there is less managerial support, managers are not involved in all aspects of IS implementation (Thong et al., 1996). Thus, managers may not attend meetings regarding IS or be involved in the analysis of information requirements (Thong et al., 1996). When the level of managerial support is low, the level of IS effectiveness is expected to be low due to a lack of information regarding business needs. Conversely, in environments with high levels of managerial support, managers are more likely to attend meetings and to be involved in the various stages of IS implementation (Thong et al., 1996). DeLone (1988) found that those small businesses that report more management involvement in IS activities also have greater levels of IS success. Furthermore, more recent research established a positive relation between the level of management support and the degree of IS effectiveness among small businesses (e.g., Igbaria et al., 1997, Thong, 2001; Thong et al., 1996; Yap et al., 1992).

Hence, IS effectiveness is expected to be high when the level of managerial support is high. As a result, the first hypothesis is stated as follows:

Hypothesis 1. Higher levels of managerial support will result in greater user satisfaction (1a), greater organizational impact (1b), and greater overall IS effectiveness (1c).

Consultant effectiveness and Information Systems effectiveness

In environments with poor consultant effectiveness, for example, consultants do not conduct a correct information requirement analysis, do not manage the implementation properly, and may have a problematic relationship with other stakeholders in the project (Thong et al., 1996). On the other hand, Thong et al. (1996) found that when the level of consultant effectiveness is high, the extent of IS effectiveness is expected to be high.

Several studies reported that a supportive external expert network, such as consultants, is positively associated with the IS effectiveness among small businesses (e.g. Cragg & King, 1993; Thong, 2001; Thong et al., 1994; Thong et al., 1996; Yap et al., 1992;).

Thus, the second hypothesis for the study is:

Hypothesis 2. Higher levels of consultant effectiveness will result in greater user satisfaction (2a), greater organizational impact (2b), and overall IS effectiveness (2c).

Vendor support and Information Systems effectiveness

IS effectiveness is likely to be low when the vendor provides poor technical support, has a limited customer base, and provides inadequate hardware and/or software solutions (Thong et al., 1996; Yap et al., 1992). In these circumstances, the resultant IS may fail without satisfying user requirements and expected benefits (Thong et al., 1996). Conversely, if vendors provide adequate service, the level of IS effectiveness is likely to be high (Thong et al., 1996; Yap et al. 1992). Thong et al. (1994) found that businesses which report adequate vendor technical support, such as quality of training given by vendors and a good relationship with other parties involved in the project, reported greater IS effectiveness. Furthermore, several studies have found a positive association between the level of vendor support and IS effectiveness (e.g., Cragg & King, 1993; Thong, 2001; Thong et al., 1996; Yap et al., 1992).

As a result, the third research hypothesis is proposed:

Hypothesis 3. Higher levels of vendor support will result in greater user satisfaction (3a), greater organizational impact (3b), and greater overall IS effectiveness (3c).

*Managerial support, consultant effectiveness, vendor support, and intention of
expansion*

A businesses that does not trust its external experts and that it is not supported by

managers regarding IS issues, is more unwilling to expand its IS. Conversely, according

to Thong (2001), a business that receives good managerial, consultant, and vendor

support is more likely to implement new IS. According to Attewell (1992), vendors and

consultants can contribute to businesses by providing the IS expertise that organizations

usually lack and, therefore, simplify the process of IS implementation. Furthermore, if

managers commit to the IS implementation, the businesses will have inner support for the

resulting IS (Thong, 2001). It can, therefore, be implied that top management support and

external experts could influence the intention to expand IS among adopter small

businesses.

Thong et al. (1994) found that some managerial characteristics are determining

factors of the likelihood of IS adoption among small businesses. In addition to this, Cragg

and King's (1993) study showed that managerial support and effective external IS

expertise are factors that encourage the growth of IS among small businesses.

Therefore the following research hypotheses are posed:

*Hypothesis 4. Higher levels of managerial support will result in greater intention of IS
        expansion.*

*Hypothesis 5. Higher levels of consultant effectiveness will result in greater intention of
        IS expansion.*

*Hypothesis 6. Higher levels of vendor support will result in greater intention of IS
        expansion.*

When a business already uses IS and is satisfied with the technology it uses, it is less reluctant to expand its IS. Conversely, when a business has had a bad experience with the IS placed in its work environment and with the IS implementation, that business may see another IS expansion as an operation that could create more problems within the organization. In these circumstances, a firm will be more unwilling to expand IS. For example, a business that currently uses IS may notice that their employees do not use the available technology often enough because it does not successfully fit with the needs of the business. In this case, the business manager does not see IS as an effective tool to facilitate his/her business operations and, therefore, he/she will be reluctant to expand its IS.

Seddon's (1997) revised model of DeLone and McLean (1992) suggests that an increase in the outcomes of IS use will lead to higher expectations about future benefits, and, therefore, to an increase in IS use. An increase in IS use means that more employees are using IS, and/or that IS is used more often or to a better extent. Usually the growth of IS usage will lead to more IS implementations and IS updates for the business.

As a result, the seventh hypothesis is proposed:

Hypothesis 7. Higher levels of user satisfaction (7a), organizational impact (7b), and overall IS effectiveness (7c) will result in greater intention of IS expansion.

Research Model for Information Systems Non- Adopter Small Businesses

Figure 4 (next page) depicts the research model for the IS non-adopter small businesses. The hypotheses with respect to this model are stated after the Figure 4.
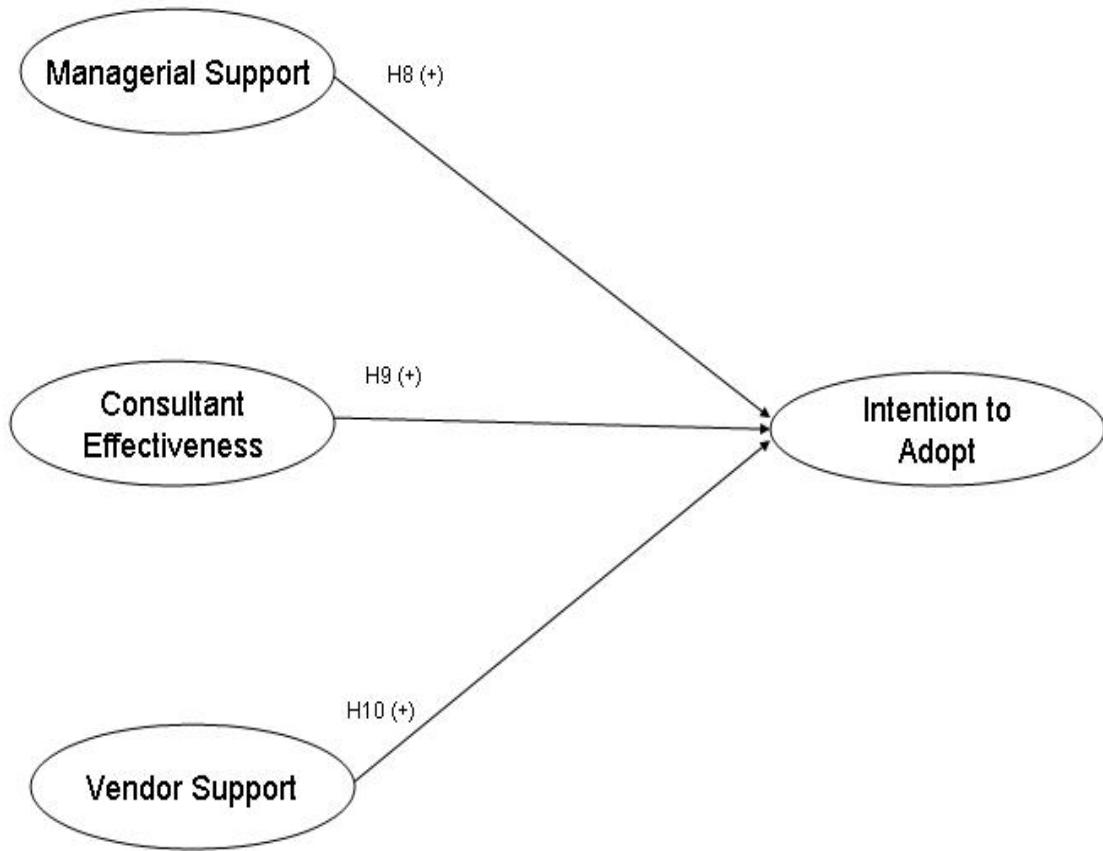
Figure 4. Research Model for Information Systems Non-Adopter Small Businesses.

When a business perceives that it will receive managerial, vendor, and consultant

support, it is more likely to adopt IS (Thong, 2001). When a business does not rely on its

internal and external potential support, it is likely that the business will be more reluctant

to adopt IS. In this situation, the business will look at a potential implementation as a

high-risk action and will refuse to adopt new IS. Based on Attewell's (1992) theory of

technology diffusion, it is theorized that the perception that small businesses get from

vendors and consultants can overcome their lack of technical knowledge and, therefore,

make it easier for them to adopt IS. It is then reasonable to think that top management

support and external expertise could be directly associated with intention of adoption.

Some studies have supported that some managerial characteristics along with the

support of external IS expertise are factors that encourage the adoption of IS among small

businesses (e.g., Cragg & King, 1993; Thong et al., 1994).

Therefore, the following research hypotheses are posed:

Hypothesis 8. Higher levels of managerial support will result in greater intention of adoption.

Hypothesis 9. Higher levels of consultant effectiveness will result in greater intention of adoption.

Hypothesis 10. Higher levels of vendor support will result in greater intention of adoption.

Chapter 3. Research Methodology

Research Method

This research project examines IS effectiveness among small businesses of a Western Canadian city with fewer than 100,000 inhabitants. According to Salmant and Dillman (1994), a survey is an appropriate tool when it can provide estimates of population characteristics. Since this study attempts to make a generalization to the population of small businesses of a mid-size city in Western Canada, it is appropriate to use a survey method. Thus, this study took the form of a cross-sectional survey in order to test the the Thong et al. (1996) model and its expansion within the context of Canadian small businesses. This was a cross-sectional study because the data were collected at a single point in time (Zikmund, 2000).

The Pretest

The purpose of a pretest is to make sure that the questionnaire measures what it is supposed to, that respondents understand and can easily answer the questions, and that the investigator can work with the questionnaire (Salmant & Dillman, 1994). A pretest also reduces systematic bias. Thus, in order to improve the quality of the questionnaire, a pretest took place before the final questionnaire was distributed.

The pretest was used to improve the cover letters (see Appendix A), the survey questions (see Appendix B), and the follow-up letter (Appendix C). The pretest was administered in two different ways. In some cases, the think-aloud interview technique was used. According to Dillman (2000), this technique is designed to produce information when the respondent is confused or cannot answer a question. Thus, this part

of the pretest consisted of giving the questionnaire to the tester and, while he/she was reading it, the investigator took notes of the comments, difficulties, concerns, and questions the tester had. In other cases, the investigator used the retrospective technique with the tester. Based on Dillman (2000), the retrospective technique is especially useful in revealing navigational difficulties that arise from the layout or the nonverbal language of the questionnaire. Following this technique, the tester was given the questionnaire and asked to review and complete the questions independently. Then, he/she returned the questionnaire with the comments to the tester. After each pretest, the investigator of the project studied the comments and decided how to address the concerns of the tester.

The pretest took place in three stages. The first stage included five students of the Master of Science in Management program and four members of the Faculty of Management. The second stage of the pretest was conducted with ten owners or managers of small businesses, who were subsequently excluded from the final sample. During this stage, the time it took the owners and managers to complete the questionnaire was also measured. The final phase of the pretest was conducted with two members of the Faculty of Management in order to ensure that the questionnaire was ready for distribution.

After the pretest and since this project involved human subjects, the investigator submitted an application form with the cover letters, the questionnaire, and the follow-up letters for ethical approval in accordance to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. This project received authorization from the Faculty of Management's research and ethics committee.

Survey Instrument

The measurements for this project were adapted from the empirical studies of Thong et al. (1996) and Harrison et al. (1997). The measurements demonstrated excellent psychometric properties, which will be reported later in this chapter. The main reason for using previously validated measurements is theoretical, that is, it allows researchers to cumulate knowledge and assure comparability between studies (Boudreau, Gefen, & Straub, 2001).

The questionnaire was divided into four sections: A, B, C, and D (see Appendix B). Section A encompassed questions asking general information about the business, such as industry type, number of employees, the days per week that the business operated and the years that the business had been operating. Section B was to be completed only by IS adopter small businesses. This section included general questions regarding IS and the items measuring vendor support, consultant effectiveness, managerial support, IS effectiveness, and intention to expand.

Section C was to be completed only by non-adopter small businesses. In this part of the questionnaire, participants were asked about the support they would receive from managers/owners, vendors, and consultants if they were hypothetically intending to implement IS in their businesses. At the end of this section, the participants were asked about their intentions to adopt IS in their business.

The last part of the questionnaire, section D, was to be completed by both adopters and non-adopters. This part consisted of an open-ended question that asked participants to include any explanations about their answers or any comments that they would like to add with respect to the questionnaire, their business, and/or IS.

Managerial support

The measurement for managerial support was adapted from the Thong et al. (1996) study (see Table D18). This measurement was first proposed and validated by Yap, Thong, and Raman (1994), and has been used in recent studies (e.g. Thong, 2001).

Thong et al. (1996) conducted different tests to measure the reliability of this measurement. First, the reliability coefficient was 0.86 (Thong et al, 1996). In addition, the Cronbach's Alpha for managerial support was 0.92 (Thong et al., 1996). Regarding convergent validity, the average variance extracted was 0.56 (Thong et al., 1996). With respect to discriminant validity, all the item loadings of managerial support were greater than or equal to 0.55 and loaded more on managerial support than on any other construct (Thong et al.,1996). Furthermore, the shared variance between managerial support and any other construct was less than the average variance extracted by the items measuring managerial support (Thong et al., 1996). Based on Zikmund (2000), when a measurement attains both, convergent validity and discriminant validity, it also meets the requirements of construct validity. Thus, the managerial support measurement in Thong et al. (1996) has construct validity.

This measurement consisted of five items: managerial attendance at computer meetings, managerial involvement in IS requirements analysis, managerial level of involvement in reviewing consultants' recommendations, managerial level of involvement in decision making relating to the IS project, and managerial level of involvement in monitoring the project (Thong et al., 1996).

The scale for this construct in this project was a seven-point Likert scale, ranging from strongly agree (1) to strongly disagree (7). Moreover, the necessity for a not

applicable (N/A) option arose in the pretest. Therefore, in this project, the scale also included a N/A selection for all the questions.

The items of managerial support were also adapted differently for those businesses that do not use IS (see question 32 of the questionnaire, Appendix B). As an example, the first item of managerial support for non-adopter businesses was expressed as follows: "If my business was to adopt computer technology, I would attend the meetings regarding computer technology in my business."

Consultant effectiveness

For measuring the consultant performance in different stages of the project, a measurement adapted from the Thong et al. (1996) study was used. This measurement was first proposed and validated by Thong et al. (1994).

Thong et al. (1996) reported a reliability coefficient of 0.89 and a Cronbach's Alpha of 0.88 for consultant effectiveness. In addition, the average variance extracted for consultant effectiveness was 0.67 (Thong et al., 1996). With regard to discriminant validity, all the item loadings of consultant effectiveness were greater than or equal to 0.60 and loaded more on consultant effectiveness than on any other construct (Thong et al., 1996). In addition, the shared variance between consultant effectiveness and any other construct was less than the average variance extracted by the items measuring consultant effectiveness (Thong et al., 1996). Furthermore, since the measurement obtained discriminant validity and convergent validity, it also met the requirements for construct validity.

The measurement is based on the IS implementation life cycle and has been utilized in recent studies (e.g., Thong, 2001). Consultant effectiveness comprised the following items: consultant effectiveness in performing information requirements analysis, consultant effectiveness in recommending suitable computerization solution, consultant effectiveness in managing the IS implementation project, and the relationship between consultant and other parties in the project (see Table E19). Like the measurement for managerial support, this measurement for this study had a seven-point Likert scale, with a N/A option.

These measurement items were assessed in terms of two dimensions, software and hardware, which Thong et al. (1996) did not include. This modification of the measurement arose during pretesting, when several testers addressed that they used different consultants for software and hardware, and that they would rank them differently.

These items were again changed for the non-adopter businesses (see question 30 of the questionnaire, Appendix B). As an example of this, one of the items was phrased as follows: "If my business was to adopt computer technology, I think consultants will be effective in understanding the needs of my business with respect to computer technology." Furthermore, all of these items had both dimensions, software and hardware, in order to facilitate potential comparisons between adopters and non-adopters.

Vendor support

Vendor support was adapted from the Thong et al. (1996) study (see Table E19). Thong et al. (1996) adopted this measure from Thong et al. (1994). In order to measure the

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construct vendor support, Thong et al. (1994) reviewed the literature concerning this concept (e.g., Lucas, Walton, & Ginzberg, 1988; Soh et al., 1992, Yap et al., 1992), and developed and validated the measurement for this construct. Later studies (Thong, 2001; Thong et al., 1996) have used this measurement.

With respect to reliability, the measurement had a Cronbach's Alpha of 0.93 and a reliability coefficient of 0.85 (Thong et al., 1996). In order to demonstrate convergent validity, Thong et al. (1996) reported an average variance extracted of 0.50. To meet the requirements of discriminant validity, Thong et al. (1996) indicated that all the item loadings of vendor support were greater than or equal to 0.56. In addition to this, the average variance extracted by the items measuring vendor support was greater than the shared variance between vendor support and any other construct (Thong et al., 1996). Again, with the requirements for discriminant validity and convergent validity met, the measurement of vendor support in Thong et al. (1996) achieved construct validity.

The measurement consisted of six items: adequacy of technical support during implementation, adequacy of technical support after implementation, quality of technical support, adequacy of training provided, quality of training provided, and relationship between vendor and other parties in the implementation process. In this research project, the items regarding the provision of training by vendors were complemented by adding two items regarding the provision of advice by vendors (see Table F20). Some testers observed that sometimes they took advice from vendors rather than participating in training sessions. The software and hardware dimensions as well as the seven-point Likert scale with a N/A option applied for consultant effectiveness, were also incorporated for this measurement in this project.

For this project, in the case of IS non-adopter businesses, the items were also modified (see question 29 of the questionnaire, Appendix B). For example, the first item of the vendor support measurement for non-adopter businesses was expressed as: "If my business was to adopt computer technology, I think vendors will provide adequate technological support during the implementation of computer technology in my business." Again, all the items included both dimensions, software and hardware.

User satisfaction

Some researchers have criticized user satisfaction measurements in general (e.g., Doll & Torkzadeh, 1988; Gelderman, 1998; Klenke, 1992). According to Klenke (1992), although user satisfaction measurements have generated a considerable body of empirical research, many of the findings have yielded inconsistent or contradictory results. Klenke (1992) stated that such findings may weaken the degree of confidence in substantive findings.

User satisfaction measurements, however, are still widely used in research investigating IS implementation in both large and small businesses (e.g., McGill, Hobbs, & Klobas, 2003; Palvia & Palvia, 1999; Thong, 2001; Thong et al., 1996). According to Thong et al. (1996), there are no other equivalent instruments that can supersede user satisfaction measurements. In addition, the use of previously developed measurements allows for comparison across different studies and for the accumulation of knowledge (Boudreau et al., 2001; Thong et al., 1996).

User satisfaction is "an attitudinal measure toward use of the resulting information systems" (Thong et al., 1996, p. 255). The measurement employed in this

study was adapted from Thong et al. (1996), who adapted this measure from Raymond's (1987) paper, in which a modified version of Pearson and Bailey's (1979) and Ives et al (1983) instruments was developed and tested (see Table G21).

The reliability analysis for the measurement of user satisfaction in the Thong et al. (1996) study reported a reliability coefficient of 0.95 and a Cronbach's Alpha of 0.94. With respect to convergent validity, the average variance extracted was 0.74 (Thong et al., 1996). Thong et al. (1996) ran two different tests for the assessment of discriminant validity. First, all the item loadings of user satisfaction were equal or greater than 0.80, and second, the shared variance between user satisfaction and any other construct was less than the average variance extracted by the items measuring user satisfaction (Thong et al., 1996). The user satisfaction measurement of Thong et al. (1996) presented construct validity, since it demonstrated convergent validity and discriminant validity.

The user satisfaction measurement consisted of seven items: the convenience of access to information, the currency of reports, the timeliness of reports, the reliability of reports, the relevancy of reports, the accuracy of reports, and the completeness of reports (Thong et al., 1996). Recent studies have used most of these items (e.g. Thong, 2001). The scale for the user satisfaction measurement in this project was a seven-point Likert scale, ranging from strongly agree (1) to strongly disagree (7).

Organizational impact

Organizational impact is "a perceptual measure of the impact of an information system on the performance of the business" (Thong et al., 1996, p. 255). This construct measurement was adapted from Thong et al. (1996), who adapted it from DeLone (1990).

Thong et al. (1996) reported adequate psychometric properties of the organizational impact measurement for reliability, convergent validity, and discriminant validity. With regard to reliability, Thong et al. (1996) reported a reliability coefficient of 0.87 and a Cronbach's Alpha of 0.85. In terms of convergent validity, the organizational impact measurement had an average variance extracted of 0.54 (Thong et al., 1996). In terms of discriminant validity, Thong et al. (1996) indicated that all the item loadings of user satisfaction were equal to or greater than 0.67. Furthermore, the average variance extracted by the items measuring organizational impact was greater than the shared variances between organizational impact and any other construct (Thong et al., 1996). In addition, this measurement achieved construct validity as a consequence of convergent validity and discriminant validity.

Thong et al. (1996) used six items to determine organizational impact: profit, sales revenue, staff productivity, competitive advantage, operations efficiency, and improved decision-making (see Table H22). In this study, this measurement had a seven-point Likert scale, with the same range as user satisfaction.

Overall Information Systems effectiveness

An overall measure of IS effectiveness is used since Thong et al. (1996) included it in their study. Thong et al. (1996) included this measure in order to capture the participants' conceptualization of IS effectiveness.

The Thong et al. (1996) measure for organizational impact consisted of a single item. However, in this project two items were used to measure overall IS effectiveness (see Table I23). The rationale behind the inclusion of a second item was that single-item

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measures tend to be less reliable than multiple-item measures and, therefore, multiple-item measures are more desirable (e.g., Loo, 2001, Loo & Kells, 1998). In this study, the measurement for organizational impact had a seven-point Likert scale, ranging from strongly agree (1) to strongly disagree (7).

Intention

The measurement of intention is adapted from the Harrison et al. (1997) study. According to Harrison et al. (1997), there are three items that assess intention: the business likelihood of IS adoption, the business plans of IS adoption, and the business commitment to adopt IS (see Table J24). These items in this project as well as in the study of Harrison et al. (1997), had bipolar anchors with a seven-point scale: (1) extremely unlikely to (7) extremely strong.

Harrison et al. (1997) reported a reliability estimate of 0.95 for the intention measurement. No analysis of internal consistency was conducted since it is reasonable to assume that people have contrasting beliefs about a relative complex course of actions (Harrison et al., 1997).

The intention measurement was adapted and used in this study in two different ways. First, it was employed to measure the intention of IS expansion in those small businesses that already used IS (see questions 25, 26, and 27, of the questionnaire, Appendix B). Second, it was also used in order to measure the intention of IS adoption of those businesses which did not use IS (see Table J24).

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Summary of the sources for the measurements

The following table summarizes the sources used for the measurements of the constructs

for this study.

Table 1
Summary of the Sources for the Measurements of the Constructs

Construct	Adapted from
Managerial support	Thong et al. (1996), original adapted from Yap et al. (1994)
Consultant effectiveness	Thong et al. (1996), original adapted from Thong et al. (1994)
Vendor support	Thong et al. (1996), original adapted from Thong et al. (1994)
User satisfaction	Thong et al. (1996), original adapted from Raymond (1987)
Organizational impact	Thong et al. (1996) , original adapted from DeLone (1990)
Overall IS effectiveness	Thong et al. (1996)
Intention	Harrison et al. (1997)

Population and Sample

Research regarding small businesses includes a wide range of variations for the definition

of what "small business" means. In the following section, the definition of small

businesses for this study is defined and supported.

Definition of Small Business

The literature is divided on how to define small business. In 2002, the European

parliament classified micro businesses as those that have 0 to 10 employees, small

businesses include those with 10 to 50 employees, and medium sized businesses are those

that employ from 50 to 250 people (Hunter & Long, 2002a). Although in the United

States, the Small Business Administration (SBA) recommends the use of the term 'small

business' for those organizations with 250 or less employees (Raymond, 1985), many

organizations in Canada use different measures to define small. For example, the Atlantic

Canada Opportunities Agency (ACOA) uses the number of employees as a definition of small business, Statistics Canada uses annual revenue as the criterion for determining the size of small firms, and some federal departments of the Government of Canada define small business by the size of investment (Diochon, Wright, Reitsma, & Pugsley, 2001). As a result, without a standard definition of small business, researchers tend to adopt different definitions within their respective research projects (Hunter & Long, 2002a).

Thong et al. (1996) defined small business based on the Association of Small and Medium Enterprises (ASME) in Singapore. Burgess (2002) advises that it is much easier to elicit the number of employees small businesses have than to obtain financial information. Taking these factors into consideration, the lack of a standardized definition of small business in Canada (Diochon et al., 2001), and the recommendation of Burgess (2002), this project used one of the Thong et al. (1996) definition criteria for small businesses: 100 or fewer employees.

Sample

In this study, a convenience sample was randomly selected from approximately 5,000 small businesses that have a valid business license in a mid-size city in Western Canada. Business licenses are required for every trade, profession, industry, occupation, employment or calling, and activity for the provision of goods and services, with the exception of some professional offices, such as lawyers, doctors, dentists, engineers, and architects.

According to Zikmund (2000), sample size may be determined on the basis of a researcher's judgment by using a sample size similar to the sample sizes used in previous

studies. Thong et al. (1996) distributed their questionnaire to 304 small businesses with a response rate of 37.5%. In this study, the researcher considered the fact that the mailing list contained businesses that may not fulfill the criterion stated for small business. Consequently, the sample size was increased to ensure that the number of potential responses for this project could be compared to those in the Thong et al. (1996) study. Hence, questionnaires were sent to 600 small businesses with an estimated response rate of 20%. According to Salmant and Dillman (1994), for a population of 5,000 members, a sample of 601 generally adequately estimates the population with a sampling error of no more than $\pm 3\%$, at the 95% confidence level. Furthermore, in order to satisfy the requirements for PLS, 60 small businesses were needed to complete the survey. The estimated response rate of 20% fulfilled these requirements.

Analytical Tools

According to Barclay, Higgins and Thompson (1995), structural equation modeling is an approach that analyzes complex networks of constructs, where each construct is typically measured by multiple items. Since the model for this study represents multiple constructs with several variables, a structural equation model will be used. Furthermore, Fornell (1982) affirms that structural equation modeling is superior to traditional factor analysis and regression due to the fact that the measurement model is assessed within the context of the theoretical structural model. Thus, it evaluates the measurement model and the structural model at the same time.

PLS and LISREL are the most widely recognized approaches for structural equation modeling (Barclay et al., 1995). Following the Thong et al. (1996) analysis technique, PLS is used as it has less restrictive assumptions and it does not depend on

normal distributions, interval scales, or large sample size. Moreover, PLS is preferable in the earlier stages of theory development (Thong et al., 1996) and it is the best suitable tool when the research is prediction oriented (Chin, 1998).

SPSS was used (e.g. MANOVA) to assess the possibility of non-response bias, comparing the responses of early returned questionnaires to late returned questionnaires as suggested by Armstrong and Overton (1977).

Chapter 4. Results

The results of the study are presented in this chapter. First, the response rate is reported. Second, the characteristics of the adopter respondents are described. Third, the results of the analyses of the measurement and structural models for the adopters are presented. Fourth, a comparison of the results of this study and those of Thong et al. (1996) is described. Finally, the characteristics of the non-adopter small businesses are presented.

Response Rate

A total of 600 questionnaires were sent to small businesses in a mid-size city in Western Canada. Although this study was conducted during the spring of 2003, the sample was selected from the 2002 Business License list of that city. There was a possibility that some questionnaires were sent to businesses that were not operating anymore, or that changed locations within the city. As a result, 43 questionnaires were returned because they did not reach the target businesses. Of the 557 questionnaires that the investigator assumed reached their destinations, 116 were returned completed, for a response rate of 20.83%. Of these 116 returned questionnaires, two were discarded because they had 1,000 or more employees and, therefore, they did not meet the definition of small business established for this study. One questionnaire was not properly completed and was, therefore, disqualified. Consequently, 113 cases were used for the analysis of the results. Of the 113 businesses, 105 businesses used IS and eight did not. Moreover, the mean number of employees was 16.79 (S.D.=22.371), which ranged from 1 to 101[3].

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[3] Although the definition for small businesses in this study is 100 or fewer employees, the business with 101 employees was included in the analysis since it was close to the definition. Moreover, a difference of one employee should not impact the results.

The sample was divided into two subsamples. The first set of responses included only those businesses that used IS. The second subsample consisted of those businesses that did not use IS.

Information Systems Adopter Small Business

This section describes the sample of small businesses that had adopted IS. The sample size for adopters was 105 small businesses. These firms employed, on average, 17.87 employees (see Table 2). The businesses operated approximately six days per week. Furthermore, small businesses reported that, on average, they had 7.41 computers.

Table 2
Demographic Data of IS Adopter Small Businesses

Characteristics	Mean (Median)	Standard Deviation
Number of employees	17.8700 (8)	22.8610
Number of days operating per week	5.7238	1.1519
Number of days office open per week	5.4515	1.0813
Number of PCs	7.4100 (8)	9.5330

The majority of the businesses operated in the retail trade and construction industries (see Table 3). Twenty-eight of the businesses reported that they offered a combination of different services. Only 15 of the 105 businesses were franchises and the majority had been operating ten or more years. Furthermore, the major market for these businesses' products was the local area, with only 10 businesses reporting an international market for their products. Finally, the majority of these firms reported that they had the resources and knowledge to purchase IS as well as the time to plan for IS.

Table 3
General Characteristics of IS Adopter Small Businesses

Characteristics	Frequency (n=105)[a]
Industry	
Agriculture	4
Manufacturing	5
Construction	18
Transportation	4
Storage	1
Communication	2
Wholesale trade	3
Retail trade	23
Finance, insurance and/or real estate	1
Businesses services	4
Education services	3
Health / social sciences	3
Accommodation, restaurants, pubs and/or bars	10
Other	28
Franchise	
Yes	15
No	89
Geographical Market	
Local	74
Provincial	11
Interprovincial (national)	8
International	10
Time Operating	
Less than 1 year	1
1 year or more and less than 3 years	10
3 years or more and less than 5 years	10
5 years or more and less than 10 years	18
10 years or more	66
Resources to Purchase IS	
Yes	89
No	14

[a]*Note*: Totals that do not add up to the total number of responses received were due to missing data.

Characteristics	Frequency (n=105)[a]
Time to Plan for IS	
Yes	71
No	34
Knowledge to Purchase IS	
Yes	80
No	25

[a]*Note*: Totals that do not add up to the total number of responses received were due to missing data.

The majority of respondents reported that both their hardware and software were provided by a single vendor (see Table 4). Descriptive responses for the 'other' category portrayed that the businesses either purchased or leased their hardware and software from the most inexpensive vendor or from a supplier that had the technology in stock. Also, approximately 83% of the managers purchased the hardware and software themselves. In addition, approximately half of the small businesses reported that they did use consultants for the purchase of software and/or hardware.

Table 4

IS Characteristics of IS Adopter Small Businesses

IS Characteristics	Frequency (n=105)[a]
Hardware Supplied by	
Head office	9
Single vendor	58
Other	37
Hardware Purchased by the Manager	
Yes	86
No	18
Consultant Aid for Hardware	
Yes	47
No	57
Software Supplied	
Head office	12
Single vendor	54
Other	38
Software Purchased by the Manager	
Yes	84
No	20
Consultant Aid for Software	
Yes	53
No	51
Time Using Compuetrs	
Less than 6 months	1
6 months or more and less than 1 year	1
1 year or more and less than 2 years	5
2 years or more and less than 3 years	5
3 years or more	93
Network	
Yes	55
No	47

[a]*Note:* Totals that do not add up to the total of responses received were due to missing data.

IS Characteristics	Frequency (n=105)[a]
Existence of an Employee in Charge of IS	
Yes	59
No	46
IS Implementation in the Past 6 Months	
Yes	63
No	42

[a]*Note:* Totals that do not add up to the total of responses received were due to missing data.

Furthermore, 93 of the small businesses had been using IS for three or more years. This is an interesting finding as it suggests that the majority of these businesses are familiar with IS. Approximately one half of the business linked their computers via networks. It is interesting to note that more than half of the small businesses reported they had an employee responsible for their IS. This may suggest that these businesses viewed IS as important. Another interesting point is that 63 of the businesses had recently implemented IS, within the past six months.

Respondents reported that accounting, word processing, Internet, and e-mail software were used the most (see Table 5). These findings are consistent with the Lefebvre and Lefebvre (1988) study. They reported that accounting applications were used the most by small businesses, followed by word processing programs. In this study, only a few businesses used applications for design or manufacturing (e.g., CAD and CAM). Over half of the firms reported that they utilized applications for planning and budgeting.

Overall, small businesses used applications primarily for administrative purposes. This finding supports Malone (1985), who reported that small business used IS for the achievement of operational tasks. Furthermore, Hunter et al. (2002) concurred with this perspective, and stated that the majority of small businesses felt that the main benefit of IS was the reduction of resources required to perform operational tasks.

Table 5
IS Applications

	Frequency (n=105)[a]		
Applications	No use	Less than 1 day per month and between 1 and 3 days per week	Between 4 and 7 days per week
Internet access	10	23	72
Word processing	9	31	69
E-mail	14	27	63
Accounts receivable	15	28	59
General ledger	12	35	55
Accounts payable	16	32	55
Inventory control	37	21	44
Spreadsheet-based analysis	27	34	42
Sales analysis	27	33	40
Sales order processing	42	20	38
Point of sales systems (POS)	60	5	34
Purchasing	41	29	30
Job costing	49	24	29
Payroll	34	50	18
Budgeting	46	38	17
Project/production planning	47	40	15
Computer Aided Design (CAD)	71	16	12
Computer Integrated Manufacturing (CIM)	84	6	6
Computer Aided Manufacturing (CAM)	83	9	4
Flexible Manufacturing Systems (FMS)	86	6	3

[a]*Note:* Totals that do not add up to the total number of responses received were due to missing data.

Nonresponse Bias

The potential for a nonresponse bias was assessed. According to Amstrong and Overton (1977), the possibility of a nonresponse bias can be assessed by comparing the responses of early returns to late returns. The distribution date of the follow-up letters was used as the criterion for categorizing early and late responses. Two MANOVA tests were conducted. The results of the MANOVA[4] test for management support, consultant effectiveness, and vendor support indicated that early and late returns were not statistically different (F=1.287, p=0.283). In addition, the results of the MANOVA[5] test of the endogenous variables of the research model - user satisfaction, organizational impact, overall IS effectiveness, and intention to expand, - were not significant (F=1.020; p=0.40).

An additional test was conducted for the number of employees. In this case, since the data were not normally distributed, a Mann-Whitney U test was used. The results of the Mann-Whitney U test were not significant (z-value=-1.885; p=0.059).

Additional comparisons were conducted for resources to purchase IS, time to plan for IS, knowledge to purchase IS, software and hardware purchased by the manager, consultant aid for the purchase of software and hardware, and time using computers. Since the data were categorical, a Pearson Chi-square test was used. The results for the Pearson Chi-square test were not significant (see Table 6).

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[4] Consultant effectiveness and management support did not fulfill the requirement of normality for MANOVA. A nonparametric test was used and it provided the same results as the MANOVA test.
[5] The data of overall IS effectiveness were not normally distributed. Therefore, a nonparametric test was used and it provided the same result as the MANOVA test.

Table 6

Pearson Chi-square Test for Nonresponse Bias

Variable	Pearson Chi-square	p
Resources to purchase IS	5.918	0.134
Time to plan for IS	0.101	0.752
Knowledge to purchase IS	2.678	0.103
Hardware purchase by the manager	0.041	0.847
Consultant aid purchasing hardware	0.565	0.454
Software purchase by the manager	0.054	0.817
Consultant aid purchasing software	3.084	0.081
Time using computers	3.147	0.207

In summary, the results of the series of MANOVAS, the Mann-Whitney U test, and the Pearson Chi-square tests were not significant. There is no evidence of a nonresponse bias.

Analysis of the Results

In this section, the results generated by PLS for IS adopters are analyzed. According to Chin (1998), a PLS model is analyzed in two stages. First, the reliability and validity of the measurement model is evaluated. Second, the structural model is analyzed.

Five cases were dropped from the sample because they had more than 50% of the data missing for various construct items. Therefore, 100 cases were used for the PLS analysis. Given this sample size, the heuristic of 10 cases per most complex multiple regression in the structural model (Barclay et al., 1995; Chin, 1998) was more than satisfied.

Analysis of the Measurement Model

The measurement model was assessed by examining the reliability, convergent validity, discriminant validity, and construct validity of the measurements. The results of the reliability and validity analysis are presented in the following sections.

Reliability

Reliability or internal consistency is "the extent to which a variable or set of variables is consistent in what is intended to measure" (Hair, Anderson, Tatham, & Black, 1998, p. 3). Three techniques were used to assess the reliability of each latent variable: individual item reliability, composite reliability, and Cronbach's Alpha.

Individual item reliability is assessed by examining the loadings, or simple correlations, of the measures with their respective construct (Barclay et al., 1995). Since all the measures are reflective, the individual loadings for each item can be examined (Chin, 1998). Barclay et al. (1995) and Fornell (1982) stated that a rule of thumb is to accept items with loadings of 0.707 or more, which implies that more than 50% of the variance in the observed variable is shared with the construct. However, Falk and Miller (1992) suggested that a loading should have a minimum loading of 0.55, which explains 30% of the variance in the construct. Thong et al. (1996) established a 0.55 criterion as the minimum loading for the items in their study. In this project, the loading criterion for individual item reliability was set at 0.65, which explains 42% of the variance in the construct. The rationale for this criterion is that it is between both, the standard guideline of 0.707 (Barclay et al., 1995) and the Thon et al. (1996) lower limit of 0.55.

For the managerial support measurement, initial analysis of its factor structure indicated that one of the items loaded (loading 0.621) below the 0.65 criterion. The item in the questionnaire was phrased as follows: "I attend the meetings regarding computer technology in my business" (question 22a of the questionnaire, see Appendix B). This item was dropped from further analysis for two reasons. First, the construct questions were modified slightly during the pretest process. The original items were used in Singapore, and the testers indicated difficulties with their applicability in a Canadian context. Second, 56% of the businesses that participated in the study had an employee in charge of IS[6]. This suggests that this employee may be the one attending most of the meetings regarding computer technology for his/her business. Furthermore, Thong et al. (1996) reported a 0.60 loading for this item. After dropping this item, all the other manifest variables loaded at 0.698 or greater for the managerial support construct (see Table 7).

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[6] A secondary PLS analysis conducted only with businesses with an IS employee indicates that this item scores considerably lower in this case.

Table 7

Loadings and Cross-Loadings for the Measurement Model (Trimmed)

Measure	Construct						
	1	2	3	4	5	6	7
Managerial Support (1)							
Involvement in information requirement analysis (MS 2)	**.897**	.092	.030	..390	.289	.370	.033
Involvement in reviewing consultant's recommendations (MS 3)	**.698**	.378	.149	.274	.085	.089	.096
Involvement in decision-making (MS 4)	**.957**	.179	.002	.448	.186	.339	.030
Involvement in monitoring the project (MS 5)	**.925**	.211	.079	.370	.152	.317	.035
Consultant Effectiveness (2)							
Effectiveness in performing information requirements analysis (CE 1 HW)	.214	**.914**	.313	.160	.015	.057	.162
Effectiveness in performing information requirements analysis (CE 1 SW)	.181	**.923**	.240	.111	.122	.081	.173
Effectiveness in recommending suitable computer solution (CE 2 HW)	.229	**.929**	.295	.135	.022	.033	.120
Effectiveness in recommending suitable computer solution (CE 2 SW)	.195	**.945**	.257	.147	.050	.126	.093
Effectiveness in managing implementation (CE 3 HW)	.226	**.935**	.277	.187	.044	.108	.144
Effectiveness in managing implementation (CE 3 SW)	.179	**.946**	.284	.201	.034	.205	.121
Relationship with other parties in the project (CE 4 HW)	.169	**.886**	.307	.118	.022	.023	.031
Relationship with other parties in the project (CE 4 SW)	.162	**.891**	.291	.139	.040	.100	.043

Measure	Construct						
	1	2	3	4	5	6	7
Vendor Support (3)							
Adequacy of technical support during IS implementation (VS 1 HW)	.140	.203	**.737**	.200	.108	.242	.030
Adequacy of technical support during IS implementation (VS 1 SW)	.009	.118	**.781**	.154	.158	.244	.148
Adequacy of technical support after IS implementation (VS 2 HW)	.125	.195	**.830**	.270	.226	.236	.101
Adequacy of technical support during IS implementation (VS 2 SW)	.028	.141	**.829**	.226	.266	.246	.272
Quality of technical support (VS 3 HW)	.079	.091	**.784**	.114	.107	.169	.087
Quality of technical support (VS 3 SW)	.020	.089	**.825**	.092	.137	.157	.158
Adequacy of advice (VS 4 HW)	.023	.190	**.837**	.172	.232	.209	.093
Adequacy of advice (VS 4 SW)	.072	.206	**.852**	.143	.231	.194	.133
Adequacy of training (VS 5 HW)	.025	.303	**.793**	.204	.177	.185	.049
Adequacy of training (VS 5 SW)	.003	.338	**.826**	.218	.207	.232	.111
Quality of advice (VS 6 HW)	.087	.258	**.672**	.123	.070	.160	.029
Quality of advice (VS 6 SW)	.001	.294	**.733**	.125	.142	.109	.072
Quality of training (VS 7 HW)	.033	.403	**.734**	.111	.046	.070	.003
Quality of training (VS 7 SW)	.070	.429	**.770**	.133	.149	.120	.068
Relationship with other parties in the project (VS 8 HW)	.087	.347	**.699**	.202	.128	.124	.156
Relationship with other parties in the project (VS 8 SW)	.010	.365	**.690**	.182	.226	.115	.245
User Satisfaction (4)							
Currency of reports (US 2)	.406	.175	.199	**.911**	.600	.657	.219
Timeliness of reports (US 3)	.397	.073	.228	**.862**	.586	.530	.248
Reliability of reports (US 4)	.287	.137	.153	**.878**	.628	.673	.305
Relevancy of reports (US 5)	.421	.158	.237	**.886**	.676	.647	.201
Accuracy of reports (US 6)	.426	.189	.228	**.896**	.528	.630	.149
Completeness of reports (US 7)	.317	.167	.129	**.872**	.566	.669	.107

Measure	Construct						
	1	2	3	4	5	6	7
Organizational Impact (5)							
Pre-tax profit (OI 1)	.185	.005	.154	.619	**.884**	.524	.361
Sales revenue (OI 2)	.187	.093	.095	.542	**.847**	.414	.278
Staff productivity (OI 3)	.268	.041	.224	.484	**.767**	.450	.364
Competitive advantage (OI 4)	.086	.082	.148	.513	**.834**	.479	.382
Operating cost (OI 5)	.225	.016	.246	.584	**.809**	.529	.317
Quality of decision-making (OI 6)	.112	.029	.240	.605	**.816**	.422	.395
Overall IS Effectiveness (6)							
Satisfaction of needs (OverallISEffect 1)	.371	.136	.215	.713	.572	**.947**	.080
Satisfaction with the overall IS effectiveness (OverallISEffect 2)	.262	.066	.235	.614	.490	**.923**	.092
Intention To Expand (7)							
Likelihood of the intention of use (IE 1)	.033	.143	.116	.189	.354	.042	**.899**
Plans to use (IE 2)	.043	.140	.148	.244	.423	.111	**.945**
Commitment to use (IE 3)	.041	.075	.158	.255	.433	.142	**.951**

With respect to consultant effectiveness, all the manifest variables performed well and satisfied the requirements for reliability. The loadings for the consultant effectiveness manifest variables ranged from 0.886 to 0.946 (see Table 7). In the case of vendor support, all the manifest variables had acceptable loadings, ranging from 0.672 to 0.852. (see Table 7).

With regard to user satisfaction, initial analysis of the measurement model indicated that question 24a (see Appendix B) had a loading of 0.586. This item was stated in the questionnaire as follows: "I am satisfied with the ease of access to the information

provided by our computers." Since this item did not satisfy the criterion for item reliability, it was trimmed from further analysis. The rationale for dropping this item is that participants indicated problems with the wording of the original item during the pretest. The modified version of the question did not totally overcome this problem. After dropping this item, loadings for the other manifest variables loaded higher than the 0.65 criterion. Therefore, the manifest variables demonstrated individual item reliability.

For the organizational impact latent variable, all the manifest variables performed well and loaded greater than 0.65. The loadings for the items ranged from 0.767 to 0.884 (see Table 7). With respect to organizational IS effectiveness, the loadings for the two manifest variables were 0.942 and 0.923 (see Table 7). Both these latent variables demonstrated individual item reliability.

All the manifest items for intention to expand had loadings of 0.899 or higher (see Table 7). Thus, the loadings for this latent variable met the requirements of item reliability for this study.

Two other widely accepted measures of reliability are composite reliability and Cronbach's Alpha. However, Cronbach's Alpha does not adjust for the number of items used to measure the construct (Chin, 1998). This means that when the number of items increases, the Cronbach's Alpha is inflated by the number of items included in the measurement. Therefore, composite reliability provides a closer approximation to reliability of the parameter estimates (Chin, 1998). Hair et al. (1998) recommends researchers to report complement estimates for reliability when reporting Cronbach's Alpha measures. In this study, both composite reliability and Cronbach's Alpha are reported for each trimmed measurement (see Table 8).

According to Hair et al. (1998), the heuristic for reasonable reliability score for Cronbach's Alpha is 0.70. The Cronbach's Alpha values for all the constructs exceeded this guideline of 0.70 (see Table 8). The highest Cronbach's Alpha was 0.9749 for consultant effectiveness and the lowest value was 0.8569 for overall IS effectiveness.

Moreover, Chin (1998) and Barclay et al. (1995) recommend a 0.70 guideline for assessing composite reliability. All the composite reliability scores were greater than 0.70 (see Table 8). Based on these results, the reliability of the latent variables was determined to be acceptable.

Table 8
Assessment of the Reliability of the Model

Construct	Mean	Standard Deviation	Composite Reliability[a]	Cronbach's Alpha
Managerial Support	3.3892	1.4410	.9282	.8971
Consultant Effectiveness	3.2029	1.3463	.9782	.9749
Vendor Support	4.1196	1.3932	.9603	.9563
User Satisfaction	2.5332	1.1440	.9556	.9443
Organizational Impact	3.2533	1.4718	.9283	.9073
Overall IS Effectiveness	2.4750	1.1577	.9328	.8569
Intention To Expand	4.1599	2.0347	.9517	.9376

Note: managerial support, consultant effectiveness, vendor support, user satisfaction, organizational impact, and overall IS effectiveness had a 7-point Likert scale, ranging from (1) strongly agree to (7) strongly disagree. Intention to expand had bipolar anchors with a seven-point scale: (1) extremely unlikely to (7) extremely strong.

[a] *Note*: Formula for composite reliability: $\rho = \dfrac{\left(\sum \lambda_i\right)^2}{\left(\sum \lambda_i\right)^2 + \sum_i \text{var}(\varepsilon_i)}$, where λ_i is the component loading to an indicator and $\text{var}(\varepsilon_i) = 1 - \lambda_i^2$; (Chin, 1998, p. 320).

Convergent validity

Convergent validity is "the overlap between different tests that presumably measure the same construct" (Vogt, 1999, p. 57). A measure of convergent validity is the average variance extracted (AVE). The AVE attempts to measure the extent of the variance that a measurement captures from its items relative to the amount due to measurement error (Chin, 1998). According to Chin (1998), AVE should be greater than 0.50. This means that at least 50% of the variance of the measurement is explained by the items (Chin, 1998).

In this study, the AVE was calculated for each latent variable (see Table 9). All the latent variables demonstrated acceptable convergent validity because the AVE scores were greater than the 0.50 guideline.

Table 9
Average Variance Extracted (AVE)

Construct	Average Variance Extracted (AVE)[a]
Managerial Support	.8751
Consultant Effectiveness	.8488
Vendor Support	.6028
User Satisfaction	.7818
Organizational Impact	.6838
Overall IS Effectiveness	.8740
Intention To Expand	.8683

[a]*Note:* Formula for AVE: $AVE = \dfrac{\sum \lambda_i^2}{\sum \lambda_i^2 + \sum_i \mathrm{var}(\varepsilon_i)}$, where λ_i is the component loading to an indicator and $\mathrm{var}(\varepsilon_i) = 1 - \lambda_i^2$; (Chin, 1998, p. 321).

Discriminant validity

Discriminant validity indicates the "extent to which a given construct is different from other constructs" (Barclay et al., 1995, p. 297). Therefore, a measure has discriminant validity when it has a low correlation with measures of dissimilar constructs (Zikmund, 2000).

Barclay et al. (1995) recommends that two methods be used in assess the discriminant validity of measurement models. The first method is for the square root of the AVE score to be larger than the correlations between the latent variables (Chin, 1998). In this study, the square root of the AVE of each construct was greater than its correlation with any other construct (see Table 10).

Table 10
Correlation Among Constructs (Square Root of AVE Extracted in Diagonals)

Construct	1	2	3	4	5	6	7
Managerial Support (1)	**.935**						
Consultant Effectiveness (2)	.212	**.921**					
Vendor Support (3)	.037	.304	**.776**				
User Satisfaction (4)	.431	.227	.168	**.884**			
Organizational Impact (5)	.217	.229	.021	.677	**.827**		
Overall IS Effectiveness (6)	.343	.239	.111	.713	.571	**.935**	
Intention To Expand (7)	.027	.154	.129	.235	.427	.092	**.932**

A second method of discriminant validity is that no manifest variable should load higher on another construct than it does on its associated latent variable (Barclay et al., 1995). In this study, the loadings for the items of their related construct are higher than those of any other item for another construct (see Table 7). Therefore, the second requirement for discriminant validity was met.

Construct validity

Construct validity is the extent to which variables accurately measure the constructs of interest (Vogt, 1999). This means that the variables reach construct validity when they measure what they are supposed to. To achieve construct validity, the measures have to meet the requirements of convergent validity and discriminant validity (Zikmund, 2000). In this study, all the measurements demonstrated acceptable convergent validity and discriminant validity. Therefore, they also satisfy the requirements for construct validity.

Analysis of the Structural Model

Once the psychometric properties of the measurement models have been assessed, the next step is to examine the structural model. The evaluation of the structural model consists of two assessments. The first assessment consists of an evaluation of the significance of the path coefficients using a nonparametric technique called jackknifing (Fornell, 1982). The second assessment is the examination of the explanatory power of the exogenous constructs (Fornell, 1982). These two assessments will be explained in the following two sections. The results[7] of the structural model are depicted in Figure 5.

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[7] The scale for intention of expansion was reversed for the analysis of the results in PLS. The rationale for this is to provide intention of expansion with the same scale order as the rest of the latent variables in the model.
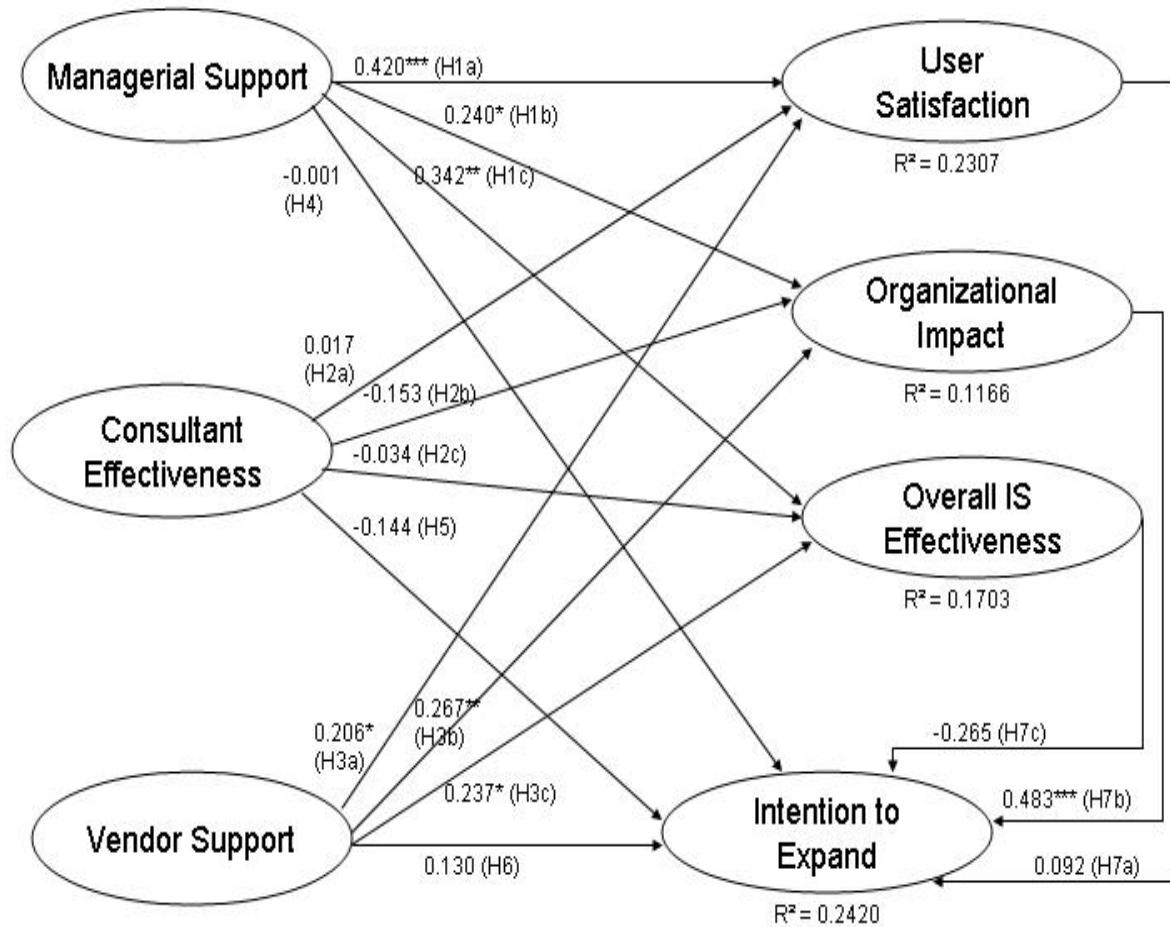
* = 0.05

** = 0.01

*** = 0.001

Figure 5. Results of the Structural Model

Analysis of the significance of the path coefficients

The significance of the path coefficients provides the basis for testing the hypotheses. Chin (1998) stated that the use of the jackknifing technique, as opposed to parametric tests, assesses the variability of the sample data rather than using parametric assumptions such as normality. The jackknife technique provides estimates and compensates for potential bias in estimates through the use of robust confidence levels (Chin, 1998). Moreover, the jackknife technique generates t-values which are used to assess the significance of the path coefficients (Barclay et al., 1995).

The results of the jackknifing technique are presented in Table 11. The first hypothesis had three components. Hypothesis 1a stated that higher levels of managerial support resulted in greater user satisfaction. The path from managerial support to user satisfaction was significant (t-value=3.3869; p=0.001) and, therefore, hypothesis 1a was supported. The second part of the first hypothesis (1b) predicted that higher managerial support resulted in greater organizational impact. This hypothesis was supported since the path coefficient was significant (t-value=1.6524; p=0.05). Hypothesis 1c stated that greater managerial support produced higher levels of overall IS effectiveness. This hypothesis was also supported (t-value=2.7458; p=0.01).

Table 11

Tests of Hypotheses and Research Questions (Trimmed)

Hypothesis	Path Coefficient (direct effect)	t-Value for Path	Indirect Effect	Total Effect
Managerial support → User satisfaction (H1a)	0.420	3.3869***	-	0.420
Managerial support → Organizational impact (H1b)	0.240	1.6524*	-	0.240
Managerial support → Overall IS effectiveness (H1c)	0.342	2.7458**	-	0.342
Managerial support → Intention to expand (H4)	-0.001	0.0287	0.258	0.259
Consultant effectiveness → User satisfaction (H2a)	0.017	0.2853	-	0.017
Consultant effectiveness → Organizational impact (H2b)	-0.153	1.4202	-	-0.153
Consultant effectiveness → Overall IS effectiveness (H2c)	-0.034	0.3808	-	0.034
Consultant effectiveness → Intention to expand (H5)	-0.144	1.4293	0.082	0.226
Vendor support → User satisfaction (H3a)	0.206	1.9439*	-	0.206
Vendor support → Organizational impact (H3b)	0.267	2.4747**	-	0.267
Vendor support → Overall IS effectiveness (H3c)	0.237	2.0472*	-	0.237
Vendor support → Intention to expand (H6)	0.130	1.3566	0.205	0.335
User satisfaction → Intention to expand (H7a)	0.092	0.6674	-	0.092
Organizational impact → Intention to expand (H7b)	0.483	4.0485***	-	0.483
Overall IS effectiveness → Intention to expand (H7c)	-0.265	2.5015	-	0.265

* = 0.05
** = 0.01
*** = 0.001

The second group of hypotheses stated that greater consultant effectiveness result in higher levels of user satisfaction (2a), organizational impact (2b), and overall IS effectiveness (2c). The paths related to these hypotheses were not significant.

Hypotheses 3a, 3b and 3c positively associated vendor support with the three variables of IS effectiveness. Hypothesis 3a, which predicted that greater vendor support resulted in greater user satisfaction, was supported (t-value=1.9439; p=0.05). Hypothesis 3b stated that higher levels of vendor support produced higher levels of organizational impact and it was supported (t-value=2.0422; p=0.01). Finally, hypothesis 3c, which predicted that greater vendor support resulted in higher levels of overall IS effectiveness, was supported (t-value=2.3472; p=0.05).

The fourth hypothesis stated that higher levels of managerial support would result in greater intention of IS expansion. Hypothesis 5 predicted a positive relation between consultant effectiveness and intention of IS expansion. The sixth hypothesis positively associated vendor support with intention of IS expansion. Hypotheses 4, 5, and 6 were not supported.

The final set of hypotheses predicted that higher levels of user satisfaction (7a), organizational impact (7b), and overall IS effectiveness (7c), would result in greater intention of IS expansion. Only hypothesis 7b was supported (t-value=4.0485; p=0.001). One possible explanation for the non-significant results regarding hypotheses 7a, and 7c, might be that the majority of respondents had implemented IS within the last six months. Additional data analysis was performed to determine if firms' recent expansion of IS biased the results. The path coefficients of managerial support with IS effectiveness increased, whereas the path coefficients for consultant effectiveness and vendor support

with IS success decreased. Interestingly, the path coefficients for consultant effectiveness and vendor support with intention of IS expansion increased substantially but in a negative direction. Moreover, the path coefficients between IS effectiveness and intention of IS expansion decreased considerably. This suggests that businesses that had recently adopted IS were reluctant to expand their IS. Additional data analysis with those businesses that did not have a recent IS expansion showed opposite effects. Therefore, it appears that the recent adoption of IS within the last six months was affecting the results.

Analysis of the explanatory power of the model

According to Barclay et al. (1995), R^2 is the predictive power of the exogenous constructs in a model. These values are interpreted in the same way as the R^2 obtained in a multiple regression analysis (Barclay et al., 1995). Therefore, R^2 indicates the amount of variance explained by the model (Barclay et al., 1995).

In this study, 23% of the variance in user satisfaction was accounted for by the model (see Figure 5 and Table 12). The predicted power of the model was similar to that reported in other small business studies. For example, Thong (2001) reported a R^2 of 0.26 for user satisfaction.

Approximately 12% of the variance in organizational impact was explained by management support, vendor support, and consultant effectiveness. Furthermore, 17% of the variance in overall IS effectiveness was accounted by the exogenous variables. Finally, 24% of the variance in intention to expand was explained by the model. The amount of variance explained by extending the Thong et al. (1996) model appears reasonable given the parsimonious model. For example, Harrison et al. (1997), reported

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that attitude, subjective norm, and perceived control, explained approximately 27% of the variance in intention to expand.

Table 12
Explanatory Power of the Independent Variables

Dependent Variable	R^2
User satisfaction	0.2307
Organizational impact	0.1166
Overall IS effectiveness	0.1703
Intention to expand	0.2420

In summary, seven of the 15 hypotheses tested by the structural model were significant (see Table 11). These results provide statistical evidence for the application of the Thong et al. (1996) model in a Canadian context.

Comparison of Results with Thong et al. (1996)

Since the Thong et al. (1996) article is the central focus for this study, it is useful to compare the results of both. This section outlines a comparison of the path coefficients as well as the explained variance of the endogenous variables.

Comparison of the Path Coefficients

The first difference was that while this study strongly supported the hypothesis regarding managerial support and user satisfaction (see Table 13), Thong et al. (1996) did not find this relation significant. The reason for this difference might be that Thong et al. (1996), distributed their survey instrument to only managers that used the IS, whereas this study did not differentiate between managers who used the IS and those who did not use IS.

Hence, in this study managers who did not use IS often expressed their opinions

regarding their satisfaction with the technology. In contrast, the relations between

managerial support and organizational impact and overall IS effectiveness reported in this

study were consistent with the results of Thong et al. (1996).

Table 13
Path Coefficient Comparison Between Thong et al. (1996) and this Study

	Path Coefficient	
Hypothesis	Thong et al. (1996)	This study
Managerial support → User satisfaction	0.01	0.420***
Managerial support → Organizational impact	0.09*	0.240*
Managerial support → Overall IS effectiveness	0.13*	0.342**
Consultant effectiveness → User satisfaction	0.19*	0.017
Consultant effectiveness → Organizational impact	0.05*	-0.153
Consultant effectiveness → Overall IS effectiveness	0.11*	-0.034
Vendor support → User satisfaction	0.33*	0.206*
Vendor support → Organizational impact	0.20*	0.267**
Vendor support → Overall IS effectiveness	0.23*	0.237*

Note: All the path coefficients in Thong et al. (1996) were significant at 0.05 or better,
except for the path from managerial support to user satisfaction.
* = 0.05
** = 0.01
*** = 0.001

Thong et al. (1996) found that consultant effectiveness impacted user satisfaction,

organizational impact, and overall IS effectiveness. In this study, the relations between

consultant effectiveness and the variables for IS effectiveness were not significant (see

Table 13). An analysis of the means of the items for the consultant effectiveness

construct indicated that small businesses of the Thong et al. (1996) study were more

satisfied with the effectiveness of consultants than the small businesses of this study. It is possible that the quality and availability of consultants might vary between Singapore and a mid-size city in Western Canada and, therefore, they might be impacting the results.

Comparison of the Explanatory Power of the Model

As in the previous section regarding the path coefficients, a comparison of the predictive power of the model between the Thong et al. (1996) study and this study is presented in Table 14. Interestingly, the predictive power of the model in both studies was similar for organizational impact and overall IS effectiveness. In contrast, the explained variance of user satisfaction in this study was lower than that reported by Thong et al. (1996).

Table 14
R^2 Comparison Between Thong et al. (1996) and this Study

	R^2	
Dependent Variable	Thong et al. (1996)	This study
User satisfaction	0.31	0.2307
Organizational impact	0.10	0.1166
Overall IS effectiveness	0.19	0.1703

Several reasons could explain the differences between the two studies. Analyzing the model with only those businesses which had an employee in charge of IS, increased the explained variance in user satisfaction to 26%. This suggests that businesses with in-house IS employees obtained IS that better matched their business needs and, therefore, they were more satisfied with their systems. Furthermore, when introducing the three resources variables – resources to purchase IS, time to plan for IS, and knowledge to

purchase IS – in the PLS model each explained variance increased substantially to over 26%. In this case, the R^2 of user satisfaction reached 0.29, closer to the Thong et al. (1996) results. According to Chin (1998), the change in R^2 can be explored to see whether the impact of recently included independent latent variables on a dependent latent variable is substantive by using the effect size f^2 formula[8]. Based on Cohen's (1988) guideline, the results of the effect size f^2 indicated that the resource variables had a medium effect on organizational impact (f^2=0.1957) and overall IS effectiveness (f^2=0.1305), and a small effect on user satisfaction (f^2=0.0900).

In addition, analyzing the model for only those small businesses that did not have any adoptions during the 6 months before this study was conducted, increased the explained variance of user satisfaction to 36%. In this case, the explained variance for organizational impact also increased to over 34%. Once again, this analysis suggests that the recent adoption of IS was affecting the results. The last chapter of this project provides a deeper discussion of the results.

Information Systems Non-Adopter Small Businesses

Only eight non-adopters responded to the questionnaire. This low response might be due to respondents' reluctance to report that they did not use IS. This sample size is not sufficient to execute PLS; however, their characteristics were examined in order to gain a better understanding of their distinct features.

Descriptive statistics were used to analyze three different groups of data. First, the type of industry and the number of employees were examined. Second, the resource

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[8] The effect size f^2 can be calculated as follows: $f^2 = \dfrac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$; (Chin, 1998, p. 316).

questions, such as IS knowledge and resources to purchase IS, were examined in order to provide an understanding of these businesses with respect to IS. Finally, the means for the theoretical constructs depicted in the research model were evaluated.

The number of employees employed by these eight firms were evaluated because several studies have reported that firm size was a factor that influenced the adoption of IS (see Table 15). The size of the businesses ranged from one to five employees. The mean of non-adopters was 2.75 employees while the mean of adopters was 17.87 employees. This is consistent with the findings of Burgess (2002), who reported that the use of computers by businesses increased depending on firm size. In this study, 92.9% of the businesses had adopted IS, and 7.1% were non-adopters.

Table 15
Number of Employees among IS Non-Adopter Small Businesses

Number of Employees	Frequency (n=8)
1	2
2	3
3	0
4	1
5	2

Industry analysis of the eight IS non-adopters was conducted. One organization reported it operated in the construction industry, another reported transportation industry, and the rest reported the "other" category. Descriptions of the other category portrayed that these small businesses operated in a combination of industries (e.g., construction and

retail of materials) or the service industry (e.g., auction sales). The geographical market of all the non-adopters businesses was local.

In addition, the average number of days they operated per week was six. A surprising result was that five cases, which represented 62.5% of the non-adopter businesses, had been operating five or more years (see Table 16). These finding suggests that these businesses were well positioned in the market.

The results of this study were consistent with findings reported in previous small business research (see Table 16). Seven businesses reported that they did not have enough time to plan for IS. This supports Lefebvre and Lefebvre (1988) finding of an absence of formal planning among small businesses. In addition, Hunter et al. (2002) explained that the use of IS requires planning and that the absence of formal planning among small businesses creates difficulties with respect to IS.

Table 16

General Characteristics of IS Non-Adopter Small Businesses

Characteristics	Frequency (n=8)[a]
Geographical Market	
Local	8
Provincial	0
Interprovincial (national)	0
International	0
Time Operating	
Less than 1 year	0
1 year or more and less than 3 years	1
3 years or more and less than 5 years	1
5 years or more and less than 10 years	1
10 years or more	5
Resources To Purchase IS	
Yes	3
No	5
Time To Plan for IS	
Yes	1
No	7
Knowledge To Purchase IS	
Yes	0
No	8
Willingness To Pay For IS Consultants	
Yes	4
No	3

[a]*Note:* Totals that do not add up to the total number of responses received were due to missing data.

Another important finding relating to small business managers' knowledge level

of IS was found. All the eight small businesses reported that they did not have enough

knowledge to purchase computer technology by themselves. This is consistent with

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Attewell's (1992) theory of technology diffusion. Based on this theory, businesses are

reluctant to implement IS because their lack of knowledge on this issue. Other studies

have reported similar barriers to IS implementation as well. DeLone (1988) and Gable

(1991) reported that small businesses usually do not have the necessary technical skills

among their personnel to maintain IS. According to Attewell (1992), small businesses can

overcome this situation with the aid of external entities, such as consultants and vendors.

In this study, four businesses reported that they would be willing to pay for IS consulting

services.

Some of the data, however, contradicted small businesses' willingness to pay IS

consultants. For example, five respondents answered that they did not have enough

resources to purchase IS. This finding is consistent with the notion of resource poverty

reported by Thong et al., (1994).

Table 17
Aggregated Mean of the Items of Each Construct

Construct (# items)	Mean	Standard Deviation
Managerial support (5)	2.3143	1.28508
Consultant effectiveness (8)	2.6786	0.96517
Vendor support (16)	4.3071	1.66675
Intention to adopt (3)	3.3810	1.97605

Finally, the means of the theoretical constructs were calculated (see Table 17).

Respondents reported that managers would support future IS adoption (mean=2.3143),

and consultants would be effective (mean=2.6786). Respondents felt that vendors would

not be supportive in the situation of IS adoption (mean=4.3071). An analysis of the item

frequencies of the answers regarding vendor support, highlighted that adequacy and quality of technological support during and after the IS implementation were viewed negatively by respondents. Finally, respondents reported almost no intention to adopt IS in the future (mean=3.3810).

Chapter 5. Discussion

The purpose of this chapter is to interpret the results of the study and place the results in the context of the research questions and literature. The chapter is divided into five sections. First, an interpretation of the similarities and differences between this study, Thong et al. (1996), and previous literature is provided. Second, the explanation of the results with regard to the intention part of the model is presented. Third, the implications for practice and research are explored. Fourth, the limitations of the study are examined. Finally, a brief conclusion to the study is provided.

The Model within a Canadian Environment

As stated earlier in this document, one of the main objectives of this study was to test the Thong et al. (1996) model within a Canadian context. The results indicate that, for the most part, the Thong et al. (1996) model is applicable to a Canadian context. Managerial support is a predictor of IS effectiveness in both studies. IS effectiveness in both studies is conceptualized as user satisfaction, organizational impact, and overall IS effectiveness. Although Thong et al. (1996) did not support the positive relation between managerial support and user satisfaction, other studies have found that in fact these two constructs are positively associated (e.g. Thong, 2001; Yap et al., 1992), which is consistent with the results reported in this study. This study provides evidence that the commitment of managers in the implementation of IS for Canadian small businesses is key for IS effectiveness.

Vendor support is positively associated with IS effectiveness. This is consistent with Thong et al. (1996) and Yap et al. (1992). This finding is also related to Attewell's

(1992) notion of knowledge barriers. Although managerial support must provide business expertise to the implementation process, vendors bring the IS experience needed, thereby lowering the barrier of the IS knowledge. Also, managerial support is more highly related to user satisfaction, organizational impact, and overall IS effectiveness than vendor support. Conversely, Thong et al. (1996) stated that vendor support was more important than managerial support for a successful IS implementation. This difference may be due to a potential different cultural interaction between vendors and managers, and Canadian small business managers appear to support vendors more than consultants. Furthermore, Thong et al. (1996) found that vendor support was more closely related to IS effectiveness than consultant effectiveness. Moreover, Thong et al. (1994) empirically supported the adoption of vendor-only services provides small business with more effective IS than consulting services or any combination of both. The findings in this study support this statement. The vast majority of the small businesses adopted IS through vendors or a combination of them. Therefore, vendor support plays a key role for the success of IS among small businesses in Western Canada.

The main difference between the two studies is found in the relation between consultant effectiveness and IS effectiveness. The Thong et al. (1996) study provided a positive association between consultant effectiveness and user satisfaction, organizational impact, and overall IS effectiveness. However, the results of this study contradict the findings of Thong et al. (1996). There are three explanations for this difference. First, the data of this study indicate that of the 105 IS adopters, only 57 used consultants to purchase hardware and/or software. The rest of the businesses obtained consulting services either through vendors or they did not employ consultants at all. Unfortunately,

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Thong et al. (1996) did not provide any information with respect to the number of small businesses that used consulting services in their study.

The second possible explanation for the different results with respect to consultant effectiveness is again related to the different characteristics of the two samples. Thus, while in Thong et al. (1996), 42 businesses out of a total of 114 had fewer than 25 employees, accounting for 42.15% of the sample; in this study, 79 of the adopter firms had fewer than 25 employees, accounting for 76% of the sample. In addition, in our study 95 businesses (91.3% of the total) had fewer than 50 employees, while in Thong et al. (1996) there were 72 businesses (63.15% of the total) with fewer than 50 employees. Furthermore, only nine businesses in this study employed between 50 and 100 employees, while in the Thong et al. (1996) study there are 41 organizations. These differences in sizes of the small businesses may provide some insight into the different results regarding consultant effectiveness. Thus, when a business has fewer employees, their operational tasks are easier to coordinate and communication may be more direct. Conversely, when a business has more employees, for example more than 50, the coordination of the tasks becomes more complex and communication may be indirect or multi-leveled. IS implementation for these two situations would be substantially different. With fewer employees, an IS implementation may be less complex and the IS requirements may be reduced. While in the first case a computer with some standard package software may work, in the second case, more computers may be required, the communication between the computers via a network may be a key part of the IS implementation and specific applications may be necessary or may need to be customized. When small businesses grow, their needs and technical requirements may

become more complex, and the extent of the impact of the IS implementation on the businesses may be more pervasive. Furthermore, larger small firms may tend to use consultants more than smaller small firms and this could also influence the results.

A third potential reason for the differences regarding consulting effectiveness between the two studies could be the location where the research was conducted. The Thong et al. (1996) study was carried out in Singapore, whereas this study was conducted in Canada. The cultural context of the different locations could be impacting the results. This study did not, however, investigate any cultural characteristics of the sample. This potential explanation warrants investigation in the future.

Extension of the Model: Intention

The second and third objectives of this study were to extend the model of Thong et al. (1996) to include the constructs intention of IS expansion and intention of IS adoption. This section interprets and discusses the main findings regarding these goals.

Intention of Expansion

Intention of IS expansion was tested within the model for those small businesses that used IS. Although only one of the hypotheses was supported, the exogenous variables explained 24% of the variance in this construct. Therefore, the results provided some interesting findings.

First, according to the results of this study, the hypotheses regarding the relations between managerial support, consultant effectiveness, vendor support, and intention of IS expansion are not supported. This contradicts previous findings. For example, Cragg and King (1993) stated that managerial support, along with external IS expertise, were factors

that encouraged the expansion of IS among small businesses. The rationale behind these contrasting results could be that the majority of these businesses had a recent expansion of IS. Thus, although managers and vendors were supportive with respect to IS, there was no need for future IS expansion. Moreover, according to Cragg and King (1993), there are other factors that may counteract the support of managers and external IS experts; economic and time constraints are factors that discourage the growth of IS and, therefore, may be impacting the results.

Second, greater levels of organizational impact result in higher intention of IS expansion. The explanation for this could be that when small businesses are satisfied with their IS, they are more willing to adopt new IS that can improve the operation of the business. That is, a manager who is pleased with the impact that IS has had on the business, may feel that IS implementations are less risky and, therefore, is more willing to adopt new IS.

Finally, it seems that businesses that adopted new IS during the previous six months of the study are more reluctant to expand IS. The rationale for this lies in the resource-based theory of the firm (Prahalad & Hammel, 1990; Wernerfelt, 1994) and the notion of resource poverty of small business (Thong et al., 1994). Small businesses, due to their financial constraints, tend to have shorter resource commitments (Stevenson, 1999). Thus, when these businesses have already directed some of their recent financial efforts toward the acquisition of IS, they may not feel the necessity to expand it, and may direct the scarce resources to other business needs.

In summary, it seems that although some of the directions in the relations between IS success, managerial support, and IS expertise with intention of IS expansion are not

clear, it is worthwhile to include this construct in the model since almost one fourth of its variance is explained by the independent variables in the model.

Intention of Adoption

Although the number of responses for this part of the sample was not large enough to test the model with PLS, analysis of the descriptive statistics provided some interesting findings. IS knowledge may play a critical role in the adoption of IS for Canadian small businesses. All the non-adopter small businesses reported a lack of IS knowledge. Conversely, the majority of adopter small businesses reported to have enough IS knowledge. This is consistent with Attewell's (1992) theory of technology diffusion. According to Attewell (1992), businesses delay the adoption of technology because they face a severe lack of IS knowledge. In addition, Cragg and King (1993) identified the absence of IS knowledge as one of the factors that discouraged IS use. This is also consistent with Thong's (1999) findings of a positive relation between the IS knowledge of a business and its likelihood of IS adoption.

Second, the majority of the non-adopter small businesses did not have enough resources to purchase IS. This is also in accordance with the resource-based theory of the firm (Prahalad & Hammel, 1990; Wernerfelt, 1994), which states that businesses are collections of resources. Furthermore, within small businesses, resources are scarce and often shape the activities of the firm (Thong et al., 1994). In these circumstances, it seems that these non-adopter small businesses are limited by their resources in their decision not to adopt IS.

Finally, non-adopter small businesses show no intention to adopt IS in the next 12 months. A possible explanation for this could be the combination of the previous two findings. That is, small business managers with no IS knowledge and high resource constraints may see the adoption of IS as a risky activity that could have a negative impact on their businesses.

Implications

The findings of this study have some implications for practitioners as well as for research. These implications are explained in the following sections.

Implications for Practitioners

There are four main implications for practitioners. First, small business managers need to get involved in the critical stages of the implementation process and the decision making with respect to IS, as well as to monitor the project and the parties involved in it. Demanding that managers supervise the implementation in detail and on a daily basis would be impractical due to the constraints on their available time. However, managerial support is the most important factor for the successful implementation of IS, and their involvement in the implementation process is essential.

Second, small businesses should engage qualified vendors who have experience, understand the unique characteristics of small business, and maintain good working relationships with all parties involved in the process. In doing this, managers should look at the reputation of vendors within the small business community and rely on vendors with good IS expertise.

Third, managers need to be aware that qualified vendors can provide not only effective IS, but they can also help businesses overcome their lack of IS knowledge. Managers should be aware that vendors can also provide adequate expertise for increasing the IS knowledge of the business.

Finally, vendors should be aware of the critical role they play in the IS implementation process of small businesses. They should direct efforts to understand the characteristics and needs of this type of business. Furthermore, vendors need to help small businesses in the acquisition of IS knowledge by providing them with quality and adequate training.

Implications for Research

There are five main implications for research. First, there is a positive association between vendor and managerial support, and IS effectiveness. Thus, this study complements previous research by having supported this association within a Canadian context. Further studies may replicate this study to enhance external validity of the results.

Second, there are contradictory findings between this study and previous literature with respect to the relation of consultant effectiveness and IS effectiveness. There are a number of potential phenomenon, such as business size and the existence of an in-house IS employee, that may be affecting the results. Future research could include these potential sources of differences in order to provide an empirical explanation of the differences between these results and previous findings.

Third, intention of IS expansion is a construct that complements the model. This study has contributed by exploring some of the relations of intention of IS expansion and the model of IS success. However, these relations are not clear enough. Future research could study the extent of the relations between IS success and intention of IS expansion.

Fourth, it would be interesting to expand the model by introducing constructs such as IS knowledge, resources to purchase IS, and time to plan for IS. The secondary results show the importance of these variables and the possibility that they could explain to a greater extent the variances of the dependent variables.

Finally, future research could investigate this model exclusively for IS non-adopter small businesses. As stated before, constructs such as IS knowledge, resources to purchase IS, and time to plan for IS, may also enrich the findings for non-adopter small businesses.

Limitations

There are four limitations that should be noted when interpreting the findings of this study. First, in this cross-sectional study, only a single research methodology has been used. Other methodologies, such as a triangulation, may enrich the findings and complement the numerical results with a deeper understanding of the situation of IS among small businesses in Western Canada.

Second, the generalization of results is difficult. First of all, the number of cases of IS non-adopter small businesses was small and the cases may not be representative of the population. Moreover, this study was conducted in a mid-size city in Western Canada. Thus, the results may not be applicable to larger cities such as Toronto or Vancouver.

Furthermore, the findings may not apply to other mid-size cities in Canada embedded in a different cultural environment, such as those in Quebec.

Third, this is a cross-sectional study and, therefore, the causality of results cannot be demonstrated. A longitudinal study could be used to determine the causal links more explicitly and to enhance the reliability of results over time.

Finally, this study did not include a cultural investigation. This study was carried out in Canada while the study of Thong et al. (1996) was conducted in Singapore. Thus, in terms of Hofstede's (1980) cultural dimensions, Singaporean and Canadian societies are different. Although the two cultures show little difference with respect to masculinity, Singapore tends to have lower uncertainty avoidance and lower individualism than Canada (Hofstede, 1980). In addition, Canada has a relatively more equal distribution of power than Singapore (Hofstede, 1980). According to Hofstede (1993), management theories developed within a specific culture are not necessarily applicable to other countries. Cultural characteristics may influence the interaction between the managers and external IS experts in each country as well as influence results.

Conclusion

The first objective of this study consisted of testing the Thong et al (1996) model of IS effectiveness within a Canadian environment. This objective has been achieved and results showed that managerial support and vendor support are predictors of IS effectiveness among the small businesses in the mid-size city in Western Canada. In contrast to the findings of Thong et al. (1996), the positive relation between consultant effectiveness and IS effectiveness was not supported.

The second purpose of this project was to expand the Thong et al. (1996) model by including the construct intention of IS expansion for adopter small businesses. With respect to this objective, although the results supported only one of the hypotheses regarding intention of IS expansion, there is evidence to support the idea that the model explains a substantial percentage of the variance of this construct.

The third objective of the project was to introduce in the model the construct intention of adoption for those businesses that do not use IS. This part of the study could not be tested, due to the low response rate. However, the non-adopters reported a lack of IS knowledge and resources to purchase and implement IS.

Future studies should direct more research efforts to further investigate the expansion of the Thong et al. (1996) model, and enhance the external validity of the results. In addition, researchers could introduce resource variables into the model to further investigate the resource constraints that small businesses face and the extent to which these variables may be influencing the results.

Overall, the findings in this project call for the engagement of quality vendors by supportive managers in order to obtain effective IS. Moreover, vendors should provide small businesses with the necessary IS expertise to implement IS, as well as with quality advice and training to increase small businesses' IS knowledge. On the other hand, small businesses' managers need to get involve in the key stages of the IS implementation process as well as to actively participate in the decision-making regarding IS.

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Appendixes

A. Cover Letters

The University of Lethbridge

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4401 University Drive • Lethbridge, Alberta • Canada T1K 3M4

20 May, 2003

Dear owner/manager,

On March 8, the Lethbridge Herald published an article stating that the City of Lethbridge ranks seventh in Canada for small business growth among cities with fewer than 100,000 residents. Therefore, the value of small businesses is paramount for the continued prosperity of the City of Lethbridge. First, small businesses are the mechanism by which national growth is created. Second, the economy is based on knowledge. Therefore, information and the mechanisms to support it, such as Information Systems, become necessary for any organization. As a result, it is important to identify the critical factors affecting the implementation of Information Systems among small businesses in the City of Lethbridge. This information will facilitate small firms with the successful adoption and use of Information Systems, as well as influence potential government policies. In order to gain knowledge about this important matter, a research project is being conducted by Ana, a MSc. Candidate, and Dr. M. Gordon Hunter and Dr. Helen Kelley, at the Faculty of Management.

Enclosed is a questionnaire that asks for your opinions on the critical issues related to Information Systems implementation in your business. **Regardless of whether your organization utilizes computer technology, you are able to complete sections of the questionnaire attached.** The questionnaire should take approximately 15 minutes to answer. Please complete the questionnaire and return it in the larger enclosed self-addressed envelope before the 13th of June. You may choose not to answer any or all of the questions. Your cooperation is completely voluntary. Your responses are anonymous, strictly confidential, and will be seen only by Ana Ortiz de Guinea Lopez de Arana, Dr. M. Gordon Hunter, and Dr. Helen Kelley at the University of Lethbridge. This project has received the authorization of the Faculty of Management in accordance to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.

At the end of the questionnaire, you have the opportunity to anonymously ask for a copy of the final results. Feel free to contact Ana Ortiz de Guinea Lopez de Arana, Dr. M. Gordon Hunter, or Dr. Helen Kelley if you have any questions about the survey or study being completed.

We value your opinions, experiences and insights, and encourage you to participate in this study. Your participation is extremely important to the success of this research and to the small business industry. Thank you for your time, participation, and feedback.

Yours truly,

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20 May, 2003

Dear owner/manager,

As a valued member of the Lethbridge business community, we hope you will take a few minutes to think about the future of business in Lethbridge. As the attached news story indicates, a national survey conducted by BMO states that Lethbridge ranks seventh in Canada for small business growth.

We have a Master's student in the Faculty of Management who is interested in taking the BMO survey one step further and defining more details specific to conducting business in Lethbridge and area. She has enclosed a survey that we hope you will complete. The final report will be made available to those who participate in the survey and indicate their interest in receiving some feedback.

We, as a business owner in Lethbridge and as the Dean of the Faculty of Management at the University of Lethbridge, recognize your time is precious, but we also recognize that local information can be helpful to Lethbridge businesses in planning for the future. We encourage you to complete the survey and return it to the Faculty.

If you have any questions about this research project, the Faculty of Management or the Advisory Council, please feel free to contact either of us.

Sincerely,

Ms. Lynda Varzari
Chair,
Faculty of Management Advisory Council

Dr. John Usher
Dean
Faculty of Management

COMPUTER TECHNOLOGY AND SMALL BUSINESSES QUESTIONNAIRE

This questionnaire will attempt to identify the critical factors affecting the implementation of computer technology among small businesses in the City of Lethbridge.

If you, as an owner/manager of a small business, feel that another manager/owner or employee is in a better position to respond to these questions, we encourage you to give this questionnaire to that individual. However, only one person at your organization should respond to this questionnaire.

YOU CAN COMPLETE THIS QUESTIONNAIRE REGARDLESS OF WHETHER YOUR ORGANIZATION UTILIZES COMPUTER TECHNOLOGY.

Thank you for your valuable time and cooperation.

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A. GENERAL INFORMATION

This section encompasses general information about your business to help us classify your answers.

1. Indicate the total number of people employed at your business, including owners/managers and part-time employees:_____ (Please **fill in the blank**).

2. Which industry does your business belong to primarily? (Please **check one box**).

ﭪ AGRICULTURE

ﭪ MANUFACTURING

ﭪ CONSTRUCTION

ﭪ TRANSPORTATION

ﭪ STORAGE

ﭪ COMMUNICATION

ﭪ UTILITIES

ﭪ WHOLESALE TRADE

ﭪ RETAIL TRADE

ﭪ FINANCE, INSURANCE AND/OR REAL ESTATE

ﭪ BUSINESS SERVICES

ﭪ GOVERNMENT SERVICES

ﭪ EDUCATION SERVICES

ﭪ HEALTH AND/OR SOCIAL SERVICES

ﭪ ACCOMMODATION, RESTAURANTS, PUBS AND/OR BARS

ﭪ OTHER (PLEASE SPECIFY): _____

3. Is your business a franchise? (Please **check one box**).

ڤ YES

ڤ NO

4. Indicate your most broadly based geographic market. (Please **check one box**).

ڤ LOCAL

ڤ PROVINCE-WIDE

ڤ INTER-PROVINCIAL (NATIONAL)

ڤ INTERNATIONAL

5. A. How many days per week does your business operate? _____(Please **fill in the blank**).

B. How many days per week is your main office open? _____(Please **fill in the blank**).

6. How long has your business been operating? (Please **check one box**).

ڤ LESS THAN 1 YEAR

ڤ BETWEEN 1 YEAR AND LESS THAN 3 YEARS

ڤ BETWEEN 3 YEARS AND LESS THAN 5 YEARS

ڤ BETWEEN 5 YEARS AND LESS THAN 10 YEARS

ڤ 10 YEARS OR MORE

7. Generally, does your business have the resources to purchase/lease needed computer technology? (Please **check one box**).

ڤ YES

ڤ NO

8. Generally, does your business have the time to plan for computer technology? (Please **check one box**).

      ڤ YES

      ڤ NO

9. Generally, does your business have the knowledge to make computer technology purchases? (Please **check one box**).

      ڤ YES

      ڤ NO

10. Indicate the number of computers/PCs operating in your business, include any computer that your business uses for work activities (i.e., your and/or your employees' computers at home, laptops, etc.). (Please **fill in the blank**).

      _____ , **proceed to section B of the questionnaire, page 5.**

      If none, proceed to section C of the questionnaire, page 14.

B. BUSINESSES WHICH USE COMPUTERS

I. GENERAL INFORMATION ABOUT COMPUTER TECHNOLOGY
This section encompasses general information about how your business gets computer technology, which includes both hardware and software.

Hardware refers to any computer technology device (i.e., printers, computers, laptops, networks, etc.).

11. How is your hardware supplied? (Please **check one box**).

 ﺛ BY A HEAD OFFICE

 ﺛ THROUGH A SINGLE VENDOR

 ﺛ OTHER (PLEASE SPECIFY):_____

 _____

12. Do you personally purchase/lease hardware for your business? (Please **check one box**).

 ﺛ YES

 ﺛ NO

13. Do you use consultants to aid your decision about hardware? (Please **check one box**).

 ﺛ YES

 ﺛ NO

Software refers to any computer-based application (i.e., Accounting applications, Sales Order Processing applications, Word Processing applications, etc.).

14. How is your software supplied? (Please **check one box**).

    ف BY A HEAD OFFICE

    ف THROUGH A SINGLE VENDOR

    ف OTHER (PLEASE SPECIFY):_____

    _____

15. Do you personally purchase/lease software for your business? (Please **check one box**).

    ف YES

    ف NO

16. Do you use consultants to aid your decision about software? (Please **check one box**).

    ف YES

    ف NO

17. How long has your business been using computer technology? (Please **check one box**).

    ف LESS THAN 6 MONTHS

    ف BETWEEN 6 MONTHS AND LESS THAN 1 YEAR

    ف BETWEEN 1 YEAR AND LESS THAN 2 YEARS

    ف BETWEEN 2 YEARS AND LESS THAN 3 YEARS

    ف 3 YEARS OR MORE

18. Do the computers in your business communicate with one another? (i.e., networked, linked). (Please **check one box**).

    ف YES

    ف NO

19. Is/are any employee/employees in charge of the computer technology at your business? (Please **check one box**).

ﻑ YES

ﻑ NO

II. EXTERNAL AND MANAGEMENT SUPPORT
This section asks questions about your perceptions of the support your business gets with respect to computer technology, which includes both software and hardware.

FOR EACH QUESTION THERE ARE **TWO DIMENSIONS**, HARDWARE AND SOFTWARE, **THAT NEED TO BE ANSWERED**. PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION AND DIMENSION THAT BEST APPLIES TO YOUR BUSINESS.

Instructions. Based on your experience, think about the person/people who have sold computer technology (software and hardware) to your business. In the following questions, that person/people would be referred to as "**vendor/s**."

		STRONGLY AGREE ↓			NEUTRAL ↓		STRONGLY DISAGREE ↓		N/A ↓
20. a. I think vendors provide adequate technological support <u>during</u> the implementation of computer technology in my business.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
20. b. I think vendors provide adequate technological support <u>after</u> the implementation of computer technology in my business.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
20. c. I think vendors provide <u>quality</u> (i.e., one that is worth it) technical support.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
20. d. I think vendors provide <u>adequate</u> (i.e., one that fits) advice for the use of computers.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
20. e. I think vendors provide <u>adequate</u> (i.e., one that fits) training for the use of computers.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8

		STRONGLY AGREE			NEUTRAL			STRONGLY DISAGREE		N/A
		↓			↓			↓		↓
20. f. I think vendors provide <u>quality</u> (i.e., one that is worth it) advice for the use of computers.	**HARDWARE**	1	2	3	4	5	6	7		8
	SOFTWARE	1	2	3	4	5	6	7		8
20. g. I think vendors provide <u>quality</u> (i.e., one that is worth it) training for the use of computers.	**HARDWARE**	1	2	3	4	5	6	7		8
	SOFTWARE	1	2	3	4	5	6	7		8
20. h. I think vendors maintain a good relationship with other parties (e.g., employees, consultants, etc.) during the implementation of computer technology.	**HARDWARE**	1	2	3	4	5	6	7		8
	SOFTWARE	1	2	3	4	5	6	7		8

FOR EACH OF THE FOLLOWING QUESTIONS THERE ARE **TWO DIMENSIONS**, HARDWARE AND SOFTWARE, **THAT NEED TO BE ANSWERED**. PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION AND DIMENSION THAT BEST APPLIES TO YOUR BUSINESS.

<u>Instructions.</u> Based on your experience, think about the person/people who have helped and given your business advice about computer technology (software and hardware). In the following questions, that person/people would be referred to as "**consultant/s.**" If, for instance, a vendor, an accountant, or one of your employees, provides you with advice and feedback with respect to computer technology then he/she is also a consultant.

		STRONGLY AGREE			NEUTRAL			STRONGLY DISAGREE	N/A
		↓			↓			↓	↓
21. a. I think consultants are effective in understanding the needs of my business with respect to computer technology.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
21. b. I think consultants are effective in recommending appropriate computer technology for my business.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
21. c. I think consultants are effective in managing the implementation of computer technology for my business.	**HARDWARE**	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8

		STRONGLY AGREE			NEUTRAL			STRONGLY DISAGREE		N/A
		↓			↓			↓		↓
21. d. I think consultants maintain a good relationship with other parties (e.g., employees, vendors, etc.) during the adoption of computer technology.	**HARDWARE**	1	2	3	4	5	6	7		8
	SOFTWARE	1	2	3	4	5	6	7		8

PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION THAT BEST APPLIES TO YOUR BUSINESS.

	STRONGLY AGREE			NEUTRAL			STRONGLY DISAGREE	N/A
	↓			↓			↓	↓
22. a. I attend the meetings regarding computer technology in my business.	1	2	3	4	5	6	7	8
22. b. I get involved in defining what computers should do for my business.	1	2	3	4	5	6	7	8
22. c. I get involved in reviewing consultants' recommendations.	1	2	3	4	5	6	7	8
22. d. I get involved in decision-making related to computer technology issues in my business.	1	2	3	4	5	6	7	8
22. e. I get involved in monitoring the process of getting computer technology for my business.	1	2	3	4	5	6	7	8

III. COMPUTERS' EFFECTIVENESS

This section assesses your perceived effectiveness of the use of computers in your business.

PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION THAT BEST APPLIES TO YOUR BUSINESS.

23. How often does your business use the following computer-based applications?

	NO USE AT ALL	LESS THAN 1 DAY PER WEEK	1 DAY PER WEEK			4 DAYS PER WEEK		7 DAYS PER WEEK	
a. Word Processing	0	<1	1	2	3	4	5	6	7
b. Spreadsheet-Based Analysis	0	<1	1	2	3	4	5	6	7
c. Project/Production Planning	0	<1	1	2	3	4	5	6	7
d. Internet access (for business purposes)	0	<1	1	2	3	4	5	6	7
e. Computer Aided Design (CAD)	0	<1	1	2	3	4	5	6	7
f. Computer Aided Manufacturing (CAM)	0	<1	1	2	3	4	5	6	7
g. Computer Integrated Manufacturing (CIM)	0	<1	1	2	3	4	5	6	7
h. Flexible Manufacturing Systems (FMS)	0	<1	1	2	3	4	5	6	7
i. General Ledger	0	<1	1	2	3	4	5	6	7
j. Accounts Receivable	0	<1	1	2	3	4	5	6	7
k. Accounts Payable	0	<1	1	2	3	4	5	6	7
l. Inventory Control	0	<1	1	2	3	4	5	6	7
m. Sales Analysis	0	<1	1	2	3	4	5	6	7
n. Sales Order Processing	0	<1	1	2	3	4	5	6	7
o. Payroll	0	<1	1	2	3	4	5	6	7
p. Purchasing	0	<1	1	2	3	4	5	6	7
q. Budgeting	0	<1	1	2	3	4	5	6	7
r. Job Costing	0	<1	1	2	3	4	5	6	7
s. Point of Sales Systems (POS)	0	<1	1	2	3	4	5	6	7

How often does your business use the following computer-based applications?	NO USE AT ALL ↓	LESS THAN 1 DAY PER WEEK ↓	1 DAY PER WEEK ↓			4 DAYS PER WEEK ↓		7 DAYS PER WEEK ↓
t. E-mail (for business purposes)	0	<1	1	2	3	4	5	6 7
u. Other (please specify): _____	0	<1	1	2	3	4	5	6 7
v. Other (please specify): _____	0	<1	1	2	3	4	5	6 7

PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION THAT BEST APPLIES TO YOUR BUSINESS.

	STRONGLY AGREE ↓			NEUTRAL ↓			STRONGLY DISAGREE ↓
24. **a.** I am satisfied with the ease of access to the information provided by our computers.	1	2	3	4	5	6	7
24. **b.** I feel that computers have helped to increase my business' sales revenues.	1	2	3	4	5	6	7
24. **c.** I am satisfied with the timeliness of the reports generated by our computers.	1	2	3	4	5	6	7
24. **d.** I feel that computers have helped to give my business an advantage over my competitors.	1	2	3	4	5	6	7
24. **e.** I am satisfied with the reliability of the reports generated by our computers.	1	2	3	4	5	6	7
24. **f.** I feel that computers have helped to improve the quality of decision-making at my business.	1	2	3	4	5	6	7
24. **g.** I am satisfied with the accuracy of the reports generated by our computers.	1	2	3	4	5	6	7

	STRONGLY AGREE			NEUTRAL			STRONGLY DISAGREE
	↓			↓			↓
24. h. I think the overall effectiveness of computers satisfies the needs of my business.	1	2	3	4	5	6	7
24. i. I feel that computers have helped my business to be more profitable.	1	2	3	4	5	6	7
24. j. I am satisfied with the up-to-date nature of the reports generated by our computers.	1	2	3	4	5	6	7
24. k. I feel that computers have helped to improve the productivity of my employees.	1	2	3	4	5	6	7
24. l. I am satisfied with the completeness of the reports generated by our computers.	1	2	3	4	5	6	7
24. m. I feel that computers have helped to reduce the operating costs of my business.	1	2	3	4	5	6	7
24. n. I am satisfied with the relevancy of the reports generated by our computers.	1	2	3	4	5	6	7
24. o. I am satisfied with the overall effectiveness of computer technology in my business.	1	2	3	4	5	6	7

IV. INTENTION TO EXPAND COMPUTER TECHNOLOGY

This section asks about your future intentions to expand computer technology in your business.

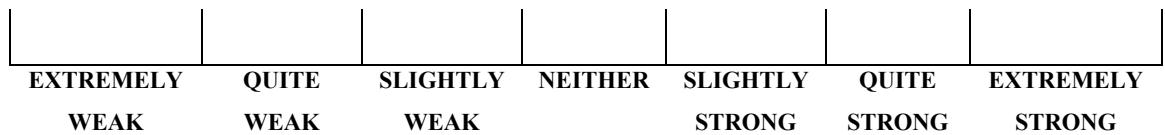PLEASE **PLACE AN "X"** IN THE RESPONSE THAT BEST APPLIES TO YOUR BUSINESS FOR EACH QUESTION.

25. How likely is it that your business will expand its computer technology within the next twelve (12) months?

EXTREMELY UNLIKELY	QUITE UNLIKELY	SLIGHTLY UNLIKELY	NEITHER	SLIGHTLY LIKELY	QUITE LIKELY	EXTREMELY LIKELY
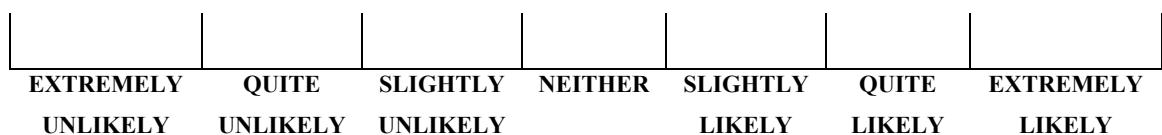
26. Does your business have plans to expand computer technology within the <u>next twelve (12)</u> months?

| EXTREMELY | QUITE | SLIGHTLY | NEITHER | SLIGHTLY | QUITE | EXTREMELY |
| UNCERTAIN | UNCERTAIN | UNCERTAIN | | CERTAIN | CERTAIN | CERTAIN |

27. Your business commitment to expand computer technology within <u>next twelve (12)</u> months is:

| EXTREMELY | QUITE | SLIGHTLY | NEITHER | SLIGHTLY | QUITE | EXTREMELY |
| WEAK | WEAK | WEAK | | STRONG | STRONG | STRONG |

28. Did your business expand its computer technology in the <u>last twelve (12)</u> months?

ﺙ YES

ﺙ NO

PLEASE PROCEED TO SECTION D ON PAGE 18 OF THE QUESTIONNAIRE.

C. BUSINESSES WHICH DO NOT USE COMPUTERS

V. EXTERNAL AND MANAGEMENT SUPPORT

This section asks how you perceive support will be provided with respect to the implementation of computer software, which includes both software and hardware.

A *vendor* is any individual who hypothetically would sell your business a product related to computer technology (software and hardware).

A *consultant* is any individual (i.e. accountant) who hypothetically would interact with your business and give you advice with respect to issues about computer technology (software and hardware). For instance, if a vendor, an accountant, or one of your employees, could provide you with advice and feedback with respect to computer technology then he/she would be viewed also as a consultant.

FOR EACH QUESTION THERE ARE **TWO DIMENSIONS**, HARDWARE AND SOFTWARE, **THAT NEED TO BE ANSWERED**. PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION AND DIMENSION THAT BEST APPLIES TO YOUR BUSINESS.

Hardware refers to any computer technology device (i.e., printers, computers, laptops, etc.).
Software refers to any computer-based application (i.e., Sales Order Processing applications, Word Processing applications, etc.).

29. If my business was to adopt computer technology, I…		STRONGLY AGREE ↓			NEUTRAL ↓			STRONGLY DISAGREE ↓	N/A ↓
a. think vendors will provide adequate technological support <u>during</u> the implementation of computer technology in my business.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
b. think vendors will provide adequate technological support <u>after</u> the implementation of computer technology in my business.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8

If my business was to adopt computer technology, I…		STRONGLY AGREE ↓			NEUTRAL ↓			STRONGLY DISAGREE ↓	N/A ↓
c. think vendors will provide <u>quality</u> (i.e., one that is worth it) technical support.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
d. think vendors will provide <u>adequate</u> (i.e., one that fits) advice for the use of computers.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
e. think vendors will provide <u>adequate</u> (i.e., one that fits) training for the use of computers.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
f. think vendors will provide <u>quality</u> (i.e., one that is worth it) advice for the use of computers.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
g. think vendors will provide <u>quality</u> (i.e., one that is worth it) training for the use of computers.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
h. think vendors will maintain a good relationship with other parties (e.g., employees, consultants, etc.) during the implementation of computer technology.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8

FOR EACH OF THE FOLLOWING QUESTIONS THERE ARE **TWO DIMENSIONS**, HARDWARE AND SOFTWARE, **THAT NEED TO BE ANSWERED**. PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION THAT BEST APPLIES TO YOUR BUSINESS.

30. If my business was to adopt computer technology, I…		STRONGLY AGREE ↓			NEUTRAL ↓			STRONGLY DISAGREE ↓	N/A ↓
a. think consultants will be effective in understanding the needs of my business with respect to computer technology.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
b. think consultants will be effective in recommending appropriate computer technology for my business.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8

If my business was to adopt computer technology, I…		STRONGLY AGREE ↓			NEUTRAL ↓		STRONGLY DISAGREE ↓		N/A ↓
c. think consultants will be effective in managing the implementation of computer technology for my business.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8
d. think consultants will maintain a good relationship with other parties (e.g., employees, vendors, etc.) during the adoption of computer technology.	HARDWARE	1	2	3	4	5	6	7	8
	SOFTWARE	1	2	3	4	5	6	7	8

31. Is your business willing to pay for computer technology consulting?

ف YES

ف NO

PLEASE **CIRCLE** THE RESPONSE FOR EACH QUESTION THAT BEST APPLIES TO YOUR BUSINESS.

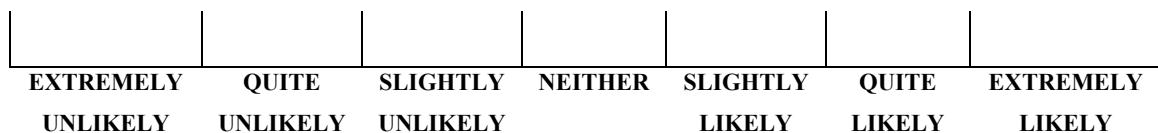| 32. If my business was to adopt computer technology, I…	STRONGLY AGREE ↓			NEUTRAL ↓			STRONGLY DISAGREE ↓
a. would attend the meetings regarding computer technology in my business.	1	2	3	4	5	6	7
b. would get involved in defining what computers should do for my business.	1	2	3	4	5	6	7
c. would get involved in reviewing consultants' recommendations.	1	2	3	4	5	6	7
d. would get involved in decision-making related to computer technology issues in my business.	1	2	3	4	5	6	7
e. would get involved in monitoring the process of getting computer technology for my business.	1	2	3	4	5	6	7

VI.   INTENTION OF COMPUTER TECHNOLOGY ADOPTION

This section asks about your future intentions to adopt computer technology in your business.

PLEASE **PLACE AN "X"** IN THE RESPONSE THAT BEST APPLIES TO YOUR CASE FOR EACH QUESTION.
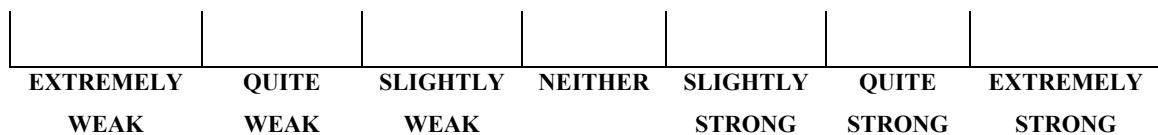
33.   How likely is it that your business will adopt computer technology within the <u>next twelve (12)</u> months?

EXTREMELY UNLIKELY	QUITE UNLIKELY	SLIGHTLY UNLIKELY	NEITHER	SLIGHTLY LIKELY	QUITE LIKELY	EXTREMELY LIKELY

34.   Does your business have plans to adopt computer technology within the <u>next twelve (12)</u> months?

EXTREMELY UNCERTAIN	QUITE UNCERTAIN	SLIGHTLY UNCERTAIN	NEITHER	SLIGHTLY CERTAIN	QUITE CERTAIN	EXTREMELY CERTAIN

35.   Your business commitment to adopt computer technology in the <u>next twelve (12)</u> months is:

EXTREMELY WEAK	QUITE WEAK	SLIGHTLY WEAK	NEITHER	SLIGHTLY STRONG	QUITE STRONG	EXTREMELY STRONG

> **This section is for ALL businesses regardless of whether they use computers/PCs.**

D. COMMENTS

This section asks for any comments that you may have that were not addressed in the previous questions.

Do you have any explanations about your answers or any comments that you would like to add with respect to your business and/or computer technology?

_____

_____

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On the following page, you have the opportunity to request the results of this study.

We sincerely appreciate the time and effort you have made in completing this questionnaire. Please return it sealed in the larger enclosed self-addressed envelope. Thank you for your valuable time and cooperation.

Ana Ortiz de Guinea Lopez de Arana (M.Sc. Candidate)
Faculty of Management
University of Lethbridge
4401 University Drive West
Lethbridge, Alberta T1K 3M4
E-mail: ana.ortizdeguinealop@uleth.ca
Phone: (403) 317-2811

Dr. M. Gordon Hunter   Dr. Helen M. Kelley
E-mail: ghunter@uleth.ca   E-mail: helen.kelley@uleth.ca
Phone: (403) 329-2672   Phone: (403) 329-2686

If you would like to receive a copy of the final results, please provide the required information:

Surname:_____ First Name:_____

Name of your business:_____

Address:_____

_____

City:_____ Postal Code:_____

Phone:_____ Fax:_____

E-mail:_____

Please separate this page from the questionnaire in order to ensure the anonymity of your survey answers, and send it in the smaller enclosed self-addressed envelope.

Ana Ortiz de Guinea Lopez de Arana (M.Sc. Candidate)
Faculty of Management
University of Lethbridge
4401 University Drive West
Lethbridge, Alberta T1K 3M4

E-mail: ana.ortizdeguinealop@uleth.ca
Phone: (403) 317-2811

C. Follow-up Letter

The University of Lethbridge

5 June, 2003

Dear owner/manager,

Recently we sent you the questionnaire *"Computer Technology and Small Businesses."* If you have already returned your organization's responses for the questionnaire, you may disregard this letter. If you have not returned your completed questionnaire, please complete and return it before the 13th of June.

Since the questionnaire has been sent only to selected small businesses within the City of Lethbridge, it is extremely important that your responses be included in the results. Your involvement will highlight the critical factors affecting Information Systems implementation among small businesses, in order to facilitate small firms with their successful adoption and use of Information Systems, as well as to influence potential government policies with respect to this issue.

If you need another copy of the questionnaire that you received earlier and would like to participate in this study, please contact Ana Ortiz de Guinea Lopez de Arana and we will arrange for another copy to be sent to you. If you do not feel that you have the time to participate or that another manager/owner is in a better position to respond to these questions, I encourage you to give this questionnaire to them.

Feel free to contact Ana Ortiz de Guinea Lopez de Arana, Dr. M. Gordon Hunter, or Dr. Helen Kelley if you have any questions about the survey or study being completed.

Thank you very much for your time and consideration.

Yours truly,

Ana Ortiz de Guinea Lopez
de Arana (MSc. Candidate)
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Phone: (403) 329-2686

Table D18
Managerial Support Measurement

Original Items (Thong et al., 1996)	Adapted Items Used in the Study (for small businesses that already use IS).
1. Managerial attendance at project meetings	1. I attend the meetings regarding computer technology in my business.
2. Managerial involvement in information systems requirements analysis	2. I get involved in defining what computers should do for my business.
3. Managerial involvement in reviewing consultant's recommendations	3. I get involved in reviewing consultants' recommendations.
4. Managerial involvement in decision-making	4. I get involved in decision-making related to computer technology issues my business.
5. Managerial involvement in monitoring the project	5. I get involved in monitoring the process of getting computer technology for my business.

E. Original Items and Adapted Items for the Consultant Effectiveness Measurement

Table E19
Consultant Effectiveness Measurement.

Original Items (Thong et al., 1996)	Adapted Items Used in the Study (for small businesses that already use IS).
1. Consultant effectiveness in performing information requirements analysis	1. I think consultants are effective in understanding the needs of my business with respect to computer technology.
2. Consultant effectiveness in recommending suitable computer solution	2. I think consultants are effective in recommending appropriate computer technology for my business.
3. Consultant effectiveness in managing implementation	3. I think consultants are effective in managing the implementation of computer technology for my business.
4. Consultant relationship with other parties in the project (CEO, Users, Vendor)	4. I think consultants maintain a good relationship with other parties (e.g., employees, vendors) during the adoption of computer technology.

Table F20
Vendor Support Measurement

Original Items (Thong et al., 1996)	Adapted Items Used in the Study (for small businesses that already use IS).
1. Adequacy of technical support during IS implementation	1. I think vendors provide adequate technological support <u>during</u> the implementation of computer technology in my business.
2. Adequacy of technical support after IS implementation	2. I think vendors provide adequate technological support <u>after</u> the implementation of computer technology in my business.
3. Quality of technical support	3. I think vendors provide <u>quality</u> (i.e., one that is worth it) technical support.
4. Adequacy of training provided	4. I think vendors provide <u>adequate</u> (i.e., one that fits) training for the use of computers. 5. I think vendors provide <u>adequate</u> (i.e., one that fits) advice for the use of computers.
5. Quality of training provided.	6. I think vendors provide <u>quality</u> (i.e., one that is worth it) training for the use of computers. 7. I think vendors provide <u>quality</u> (i.e., one that is worth it) advice for the use of computers.
6. Relationship with other parties in the project (CEO, Users, Consultant)	8. I think vendors maintain a good relationship with other parties (e.g., employees, consultants) during the implementation of computer technology.

G. Original Items and Adapted Items for the User Satisfaction Measurement

Table G21
User Satisfaction Measurement

Original Items (Thong et al., 1996)	Adapted Items Used in the Study
1. Convenience of access	1. I am satisfied with the ease of access to the information provided by our computers.
2. Currency of reports	2. I am satisfied with the up-to-date nature of the reports generated by our computers.
3. Timeliness of reports	3. I am satisfied with the timeliness of the reports generated by our computers.
4. Reliability of reports	4. I am satisfied with the reliability of the reports generated by our computers.
5. Relevancy of reports	5. I am satisfied with the relevancy of the reports generated by our computers.
6. Accuracy of reports	6. I am satisfied with the accuracy of the reports generated by our computers.
7. Completeness of reports	7. I am satisfied with the up-to-date nature of the reports generated by our computers.

H. Original Items and Adapted Items for the Organizational Impact Measurement

Table H22
Organizational Impact Measurement

Original Items (DeLone, 1990; Thong et al., 1996)	Adapted Items Used in the Study
1. Pre-tax profit	1. I feel that computers have helped my business to be more profitable.
2. Sales revenue	2. I feel that computers have helped to increase my business' sales revenues.
3. Staff productivity	3. I feel that computers have helped to improve the productivity of my employees.
4. Competitive advantage	4. I feel that computers have helped to give my business an advantage over my competitors.
5. Operating cost	5. I feel that computers have helped to reduce the operating costs of my business.
6. Quality of decision-making.	6. I feel that computers have helped to improve the quality of decision-making at my business.

I. Original Items and Adapted Items for the Overall Information Systems Effectiveness Measurement

Table I23
Overall IS Effectiveness Measurement

Original Items (Thong et al., 1996)	Adapted Items Used in the Study
1. Overall IS Effectiveness	1. I think the overall effectiveness of computers satisfies the needs of my business. 2. I am satisfied with the overall effectiveness of computer technology in my business.

J. Original Items and Adapted Items for the Intention of Information Systems Adoption Measurement

Table J24
Intention of IS Adoption Measurement

Original Items (Harrison et al., 1997)	Items Used in the Study
1. How likely is that your firm intends to use _____ within the next 6 months?	1. How likely is it that your business will adopt computer technology within the <u>next twelve (12)</u> months?
2. How certain are your plans to use _____ within the next 6 months?	2*.* Does your business have plans to adopt computer technology within the <u>next twelve (12)</u> months?
3. Our firm's commitment to using _____ in the next 6 months is?	3. Your business commitment to adopt computer technology in the <u>next twelve (12)</u> months is