

SME Adoption of e-Commerce in the Central Okanagan Region of Canada

Lynn Sparling
Okanagan College
Kelowna, British Columbia, Canada
Email: lsparling@okanagan.bc.ca

Mark Toleman, Aileen Cater-Steel
School of Information Systems
University of Southern Queensland
Toowoomba, Australia
Email: {markt, [caterst](mailto:caterst@usq.edu.au)}@usq.edu.au

Abstract

The adoption of e-commerce by small-medium enterprises (SME) in Canada remains low. The Central Okanagan region of British Columbia is typical in terms of the relative density of SMEs' e-commerce activity. In this study, a survey of SMEs' adoption of e-commerce was conducted to determine reasons for this low adoption. Constructs used in the survey focussed on three contexts: organizational, external environmental and innovation. The study found significant factors that differentiated adopters and non-adopters of e-commerce included technological opportunism and readiness, owner experience with computers, support within the organization, relative advantage and compatibility. Limitations of the study's sample size preclude generalization to all Canadian SMEs, but the trends suggest that further research should be a priority for government, industry and research academics.

Keywords

E-commerce adoption, Small medium enterprises, diffusion of innovation, Canada.

Introduction

Canadian companies received \$39.2 billion in customer orders over the Internet in 2005, up from \$28.3 billion in 2004 (Industry Canada 2006). This growth in Internet sales has not been accompanied by an increased adoption of e-commerce by Canadian companies. The percentage of Canadian companies with a website has remained stagnant at 38 percent and the number of firms engaged in e-commerce has remained unchanged since 2001 at seven percent (Industry Canada 2005). Despite four consecutive years of strong double-digit growth in online sales in 2005, e-commerce still accounted for just over one percent of total operating revenues for private firms (Industry Canada 2005). Hence understanding the drivers and barriers of e-commerce adoption becomes increasingly important (Zhu, Kramer & Xu 2003). SMEs are the cornerstone of the Canadian economy - 99 percent of all established businesses in Canada had fewer than 200 employees (Industry Canada 2006). To date very few studies have been conducted that examine the factors influencing adoption of e-commerce by SMEs in Canada. For the purpose of this study, small- to medium-sized enterprises (SMEs) are defined as businesses with fewer than 200 employees. The definition of SME as businesses with fewer than 200 employees concurs with the definitions used by the Central Okanagan Regional District, and with similar studies such as Sathye and Beal (2001), Lertwongsatien and Wongpinunwatana (2003), and Banham (2004). E-commerce refers to the processing of business transactions using computer networks, including the Internet. This study concentrates on the adoption of e-commerce by SMEs operating in the Central Okanagan region of British Columbia, Canada. The main question to be answered by this research is: *Are there differences in the characteristics of the small- to medium-sized enterprises in the Central Okanagan region that have adopted e-commerce as compared to the non-adopters?*

Highlighting these differences will help SMEs as they plan for increases in their e-business initiatives. An agenda for future research in the adoption of e-commerce by SMEs is proposed.

Review of e-Commerce Adoption Literature

This study uses Rogers' (1995) definition of adoption: adoption is the decision to make full use of an innovation as the best course of action available, while rejection is the decision to not adopt. Rogers (1995) and many subsequent researchers, including Kendall et al. (2001) and Saythe and Beal (2001), have shown that

perceptions of the attributes of an innovation affect its rate of adoption. Rogers (1995) identified five perceived attributes of innovations that affect their rate of adoption: relative advantage, degree of compatibility of the innovation, complexity, trialability and observability. He found these five characteristics to be the main determinants explaining 49 to 87 percent of the variance in the rate of adoption (Rogers 1995).

As innovation research moved from simple innovation to more complex organizational and technological innovation, the need for many variables became apparent. Ling (2001) argues that diffusion of innovation theory is relevant to the study of e-commerce due to the technical components of e-commerce, but that e-commerce has unique features, such as interorganizational elements, which distinguish it from other types of innovations. The technological innovation literature has not produced a consistent set of factors that affect organizational adoption. Almost all the studies of technological innovation adoption have separated the explanatory variables into meaningful factors or contexts. Ramamurthy and Premkumar (1995) used interorganizational and organization variables, Ling (2001) used internal and external environments, and Ching and Ellis (2004) used decision-maker, innovation and environmental characteristics. Tornatzky and Fleischer's (1990) model, used by Henrikson (2002), suggested that there are three explanatory contexts that influence the process by which technological innovations are adopted in organizations: the organizational context, the technological context and the external environmental context. The e-commerce adoption studies have mainly focused on SMEs, realizing the importance of small business in the global economy and the potential benefits for SMEs of adoption of e-commerce. Two separate studies, one in Singapore and another in Australia, examined the low adoption rates of e-commerce by SMEs by comparing adopters with non-adopters. These two studies, conducted by Kendall et al. (2001) and Sathye and Beal (2001) examined the perceptions held by SMEs of the attributes of e-commerce using Rogers' innovation diffusion theory (1995). Kendall et al. (2001) found that adopters and non-adopters differed in terms of perceptions of relative advantage, compatibility, and trialability. Sathye and Beal (2001) found differences based on perceived relative advantage, compatibility, and organization size.

No studies have examined e-commerce adoption by Canadian SMEs and none have compared adopters to non-adopters in Canada. This study uses a unique combination of variables, organized in the three contexts identified by Tornatzky and Fleischer's (1990). The model is presented in Figure 1. Each factor included in the model has been shown to increase e-commerce adoption rates in at least one previous study, but no study has tested this combination of factors.

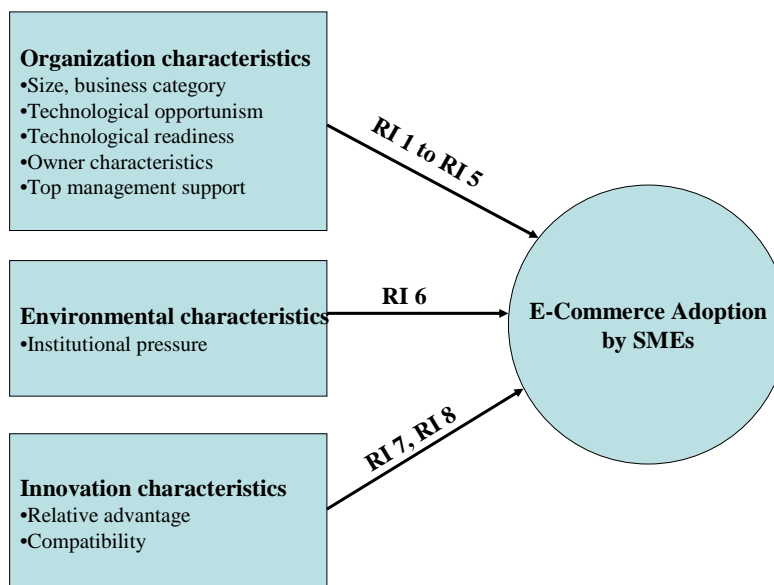


Figure 1: Proposed model of e-commerce adoption

Organizational Context

This context relates to the characteristics of an organization. The organization characteristics considered in this study are organization size and business category, technological opportunism, technological readiness, owner characteristics, and organizational support.

Size and Business Category. To date, predominantly large firms are using the Internet (Baker 2000, Industry Canada 2004, NOIE 2000). When studying SMEs that use e-commerce to do business internationally, Tiessen, Wright and Turner (2001) found a positive link between firm size and the SME's Internet commitment. This is consistent with other adoption studies (Frambach & Schillewaert 2002, Grover 1993, and Thong 1999). The NOIE (2000) study noted that more Australian firms in the business and personal services industry were using the Internet to place orders online than businesses in other industry sectors. The NOIE (2000) study also found that e-commerce was being used as a significant element in the supply chain of businesses in the transport and storage industry. In Canada, four sectors led the way in terms of value of online sales in 2005: wholesale trade, retail trade, transportation and warehousing, and manufacturing (Statistics Canada 2006). The first research issue considers whether the size of the SME and the type of business conducted by the SME affect the adoption of e-commerce. **RI1:** *Do adopting organizations differ from non-adopters in terms of size and business category?*

Technological Opportunism. Srinivasan, Lilien and Rangaswamy (2002) identified technological opportunism, the sense-and-respond capability of firms with respect to new technologies, as an important determinant of radical technology adoption. Wu, Mahajan and Balasubramanian (2004) examined how the learning ability of organizations facilitated e-business adoption. The second research issue examines the effect that an SME's ability to sense and respond to technology has on the adoption of e-commerce. **RI2:** *Do adopting organizations differ from non-adopters in terms of technological opportunism?*

Technological Readiness. Technological readiness concerns the level of sophistication of IT usage and management in the organization. This study expects that companies currently using computer systems compatible with e-commerce would be more likely to accept the new technology and new ways of conducting business. The third research issue addresses what effect previous experience with computerized systems has on the adoption of e-commerce. **RI3:** *Do adopting organizations differ from non-adopters in terms of technological readiness?*

Owner Characteristics. Entrepreneurial qualities, especially those of the owner, have often been used to explain the success of a business. Maxwell and Westerfield (2002) related technological entrepreneurial characteristics to the adoption of innovative technology, finding small firms that adopt innovative technologies tended to be led by *opportunistic* type entrepreneurs. Thong (1999) found that two characteristics of a firm's decision maker or CEO, innovativeness and IS knowledge, were positively associated with adoption of information systems in small businesses. Ching and Ellis (2004) examined the firm's decision maker's characteristics and found the decision-maker's age, level of education and cosmopolitanism to be significant predictors of e-commerce adoption. These factors were combined into the fourth research issue: **RI4:** *Do adopting organizations differ from non-adopters in terms of owner characteristics?*

Organizational support. Several studies have shown that senior management support plays an important role in technological innovation adoption (Lertwongsatien & Wongpinunwatana 2003; Tsao, Lin & Lin 2004; Grover 1993). This study anticipated that the level of organizational support would differ between SMEs that adopt e-commerce and the non-adopters. This led to the development of research issue five: **RI5:** *Do adopting organizations differ from non-adopters in terms of organizational support of e-commerce?*

External Environmental Context

Typically the external environmental context includes market conditions such as competitive market forces, market uncertainty, and government regulation. Srinivasan, Lilien and Rangaswamy (2002) identified two components of institutional pressure: stakeholder pressure and competitive pressure. Stakeholder pressure can come from customers, trading partners, investors, suppliers, media and employees. Competitive pressure forces a business to adopt a technology to maintain competitive advantage. As more competitors and trading partners adopt an innovation, small firms are more inclined to adopt the innovation in order to maintain their own competitive position. Companies have suffered reduced competitiveness resulting from not implementing IT improvements to match their competitors. Customers may pressure a business to provide its products/services online and non-adoption of e-commerce will be a competitive disadvantage. Suppliers may pressure a business to order online. Many governments, such as the Australian government, and large corporations are seeking to encourage the rapid take-up of e-commerce by business by mandating that their suppliers do business with them online (NOIE 2000).

Porter (2001) points out that Internet technology provides better opportunities for companies to establish distinctive strategic positioning than did previous generations of information technology. He believes that in order to remain competitive, companies are going to be forced to adopt Internet technology. Stakeholders such as customers, trading partners, suppliers, investors, the media and employees, can pressure a firm into adopting e-commerce. Relationships with any of the stakeholders may suffer if the firm does not implement e-commerce initiatives. In some cases, suppliers or customers may demand e-commerce for continuing relationships.

Investors may view the firm as being technologically backward without e-commerce capabilities. Firms may feel that they will be left behind if they do not adopt e-commerce. This study expects that firms facing greater institutional pressure would be more likely to adopt e-commerce. Studying institutional pressure on SMEs to adopt e-commerce helps define opportunities for SMEs to gain competitive advantage. This study addresses the following research issue relating to environmental characteristics: **RI6: Do adopting organizations differ from non-adopters in responding to institutional pressure to adopt e-commerce?**

Innovation Characteristics

Based on the results of Ching and Ellis (2004), Kendall et al. (2001) and Saythe and Beal (2001), this study selected two of the five factors included in Rogers' theory: relative advantage and compatibility.

Relative advantage is one of the most frequently used innovation characteristics in adoption research. Examples of benefits commonly associated with the adoption of e-commerce are: increased sales and profits, reduced costs, improved customer service and relationships, development of new markets, and streamlined business processes. Canadian SMEs reported improved financial results attributed to e-commerce in the form of increased revenue and decreased operating costs (McClellan, Johnston & Wade 2002). On the other hand, few small businesses in Poon and Swatman's (2002) Australian study could identify direct, quantifiable benefits from Internet use, but most felt that indirect benefits were keeping them connected to the Internet. The positive perception by a small business that e-commerce will result in economic or social benefits should provide incentive for the business to adopt e-commerce. This expectation is reflected in research issue seven **RI7: Do adopting organizations differ from non-adopters in their perception of the relative advantage of e-commerce?**

Compatibility perceptions can include how well e-commerce fits with supplier and customer business processes, and how well e-commerce fits with the firm's current business processes. This fit can be both technical and organizational. Greater compatibility of an innovation with the organization should be positively related to adoption of the innovation, leading to research issue eight. **RI8: Do adopting organizations differ from non-adopters in their perception of the compatibility of e-commerce with the firm's business processes and those of its suppliers and customers?**

Summary: Using a unique combination of the models and factors found significant in previous research studies, three categories of characteristics of SME e-commerce adopters and non-adopters are examined in this study. The three categories are: organizational characteristics, environmental characteristics, and innovation characteristics as shown in Figure 1. Supporting references are provided for each variable and can be found in Appendix 1.

Research Design and Methodology

After selecting the small firm characteristics to be included in this study, a survey was developed. This self-administered survey was distributed to a sample of SMEs in the Central Okanagan region and is the main form of data collection for this study. The survey gathers several types of information: basic demographics about the businesses surveyed; whether the enterprise has adopted e-commerce as defined by whether any business is conducted using the Internet; information concerning the research issues identified in the research objectives.

The target population for this study is all SMEs in the Central Okanagan region. There are approximately 6516 businesses in the Central Okanagan region that have fewer than 200 employees. The proposed unit of analysis is each SME. Many of the survey items are adapted from previous studies, such as Kendall et al. (2001), Kickul and Gundy (2001) and Srinivasan, Lilien and Rangaswamy (2002). Survey questions were pilot tested on a sample group of SMEs. Recommended changes were incorporated into the survey before final distribution.

The survey was distributed by mail and e-mail. Businesses returned the survey by mail, fax or complete a web-based version online. The survey and letter were targeted so that the respondent is most likely the owner/CEO of the business, which in most SMEs is the same person. Systematic sampling was used to select 892 SMEs from the list of businesses provided by the Central Okanagan Economic Development Commission.

Survey Questionnaire

Questions in the survey are structured, with a limited number of responses for each. Appendix 2 includes a list of survey items and associated scales. The measurement scales are consistent with similar studies that have measured these attributes, such as Srinivasan, Lilien and Rangaswamy (2002) and Saythe and Beal (2001). The first section of the survey relates to the SME's used of e-commerce. Section B includes the items used to measure relative advantage and compatibility. Section C measures the technological opportunism and readiness of the SME, as well as the organizational support for e-commerce in the organization. The final section of the survey gathers general information about the company and its owner.

In all, 563 surveys were mailed to SMEs in the Central Okanagan region and 329 were e-mailed, for a total of 892 surveys. After follow-up notices were sent, a total of 110 surveys were returned or completed online, but only 94 were complete enough to be used for data analysis, a 12 percent response rate. Of these, 57 were returned via mail, with 37 completed online. When comparing the response rates for the mailed surveys and the emailed surveys, both were very close to the overall 12 percent rate. Response rates for prior e-commerce adoption studies varied widely – ranging from 12 percent (Zhuang & Lederer 2004) to 32.5 percent (Lertwongsatien & Wongpinunwatana 2003). Due to the low response rate, the results will need to be viewed with caution.

Instrument reliability and validity

Cronbach's alpha was used in this study to assess the reliability or internal consistency of each multi-item measure that uses an interval scale, the Likert scale in this case. Multi-item measures were used for six variables: technological opportunism, technological readiness, support of e-commerce, institutional pressure, relative advantage, and compatibility. After dropping two questions, all measures except the one for compatibility had alpha values above the minimum 0.7. Because the two items used to measure compatibility had been used previously by Kendall et al. (2001) and Sathye and Beal (2001), it was decided to continue to analyze the compatibility measure but treat the results with caution.

Face validity was ensured by pretesting the questions with colleagues and with eight SME managers. Factor loadings are calculated to measure the importance of the item in measuring each factor (Zikmund 2000). A factor loading above 0.5 between an item and the variable it is intended to measure is necessary to ensure construct validity (Chau & Tam 1997). Factor analysis can only be conducted on variables that use an interval or ratio scale: technological opportunism, technological readiness, support of e-commerce, institutional pressure, compatibility, and relative advantage in this case.

The questions relating to institutional pressure from stakeholders and competitors loaded onto one component, One of the questions measuring compatibility, question B8, also loaded onto this component. This could be due to the fact that the question relates to customers' and suppliers' use of e-commerce. The two items that relate to meeting customers' needs, questions B1 and B2, loaded onto a component which appears to represent institutional pressure from customers. The second question measuring compatibility, question B9, does not appear to load onto any of the components. Since the compatibility questions did not perform as expected for reliability or validity, any results must be interpreted with caution.

All ten variables used to measure technological opportunism and technological readiness were highly correlated and could be considered to measure one component, instead of two. These results show that technological opportunism and technological readiness are highly correlated and could be considered as one factor. In the analysis of the survey data, technological opportunism and readiness are examined separately. Additional analysis is performed using a new factor that combines the two factors. The three items that measure organizational support of e-commerce are highly correlated and load onto only one factor, as expected. Survey questions C15.1 to C15.6 relate to relative advantage. All questions were highly correlated with only one component – relative advantage.

Survey Results

Of the 94 respondents, 56 (60%) had already implemented e-commerce and twenty-five (27 %) had no intention of implementing e-commerce. Only thirteen percent of SMEs had any intention of adopting e-commerce in the future, with eight intending to within the next year and only five intending to within one to two years. Only seven have been in business for less than five years. The majority (57%) have been in business for over 15 years. Nineteen percent had been in business between 11 and 15 years, and the remaining 13 percent for 5 to 10 years. The respondents came from a variety of business categories. The categories with the largest representation are construction (14%), retail (13%), other services (13%), and both professional, scientific and technical, and accommodation and food services at 11 percent.

SME owners who responded to the survey tend to be computer literate and involved in computer related purchases. Almost all owners (87%) were involved in the choice of computers and information technology at their businesses. Half of the owners had received formal computer training, and most owners (82%) used the computer on a daily basis. Highest education levels varied, with the largest group having pursued post-secondary education (46%). Thirty percent had only high school education, while sixteen percent had post-graduate degrees.

Comparison of Adopters and Non-Adopters

The survey responses were used to compare specific characteristics of businesses that had adopted e-commerce with organizations that had not adopted e-commerce. Table 1 summarizes the findings for each of the research issues and whether any significant differences were found between SMEs that had adopted e-commerce and those that had not.

Table 1: Summary of Research Issue Results

Characteristic	Research Issues	Significance of difference between adopters and non-adopters
<i>Organizational</i>	RI1: Organization characteristics – size, industry	Not significant
	RI2: Technological opportunism	Significant
	RI3: Technological readiness	Not significant
	RI2 & RI3: Combined technological opportunism and readiness	Significant
	RI4: Owner characteristics – use of computers RI4: Owner characteristics – education, formal IT training, involved in IT choice	Highly significant Not significant
	RI5: Organization support of e-commerce	Very highly significant
<i>Environmental</i>	RI6: Institutional pressure	Not significant
<i>Innovation</i>	RI7: Relative advantage	Very highly significant
	RI8: Compatibility	Very highly significant

Organizational Characteristics

Businesses were compared based on the number of employees, the number of years the business had been operating and the type of business. The answer to the first research issue is that SMEs that had adopted e-commerce did not differ significantly from non-adopters on any one of these three organizational characteristics. The large majority of both adopters and non-adopters had fewer than 20 employees and had been in business more than ten years. Both adopters and non-adopters were in various types of businesses.

Technological Opportunism and Technological Readiness

Research issues two and three addressed each SME's technological opportunism and technological readiness. Because multiple items were used on the survey to measure each characteristic, summary variables were calculated for each using the average of the relevant items. As well as the summary technological opportunism and technological readiness variables, an overall summary variable was calculated for the two combined, due to the fact that all ten items loaded onto a single factor in the factor analysis.

There is a significant difference between adopters and non-adopters with respect to technological opportunism ($t = 2.331, p = .022$) but no significant difference based on the technological readiness summary variable. When the two variables were combined there was still a significant difference ($t = .475, p = .015$) between businesses that had adopted e-commerce and those that had not. Overall adopters tended to be more technologically opportunistic and technologically ready than non-adopters.

Owner Characteristics

For research issue four, data was gathered to measure four owner characteristics: whether the owner was involved in the choice of computers and information technology, had received formal computer training, used computers frequently and owner's highest education level. Adopters and non-adopters differed significantly with respect to owners' frequency of use of computers. Almost all owners (98 percent) of businesses that had adopted e-commerce used computers daily, compared to 73 percent for owners of non-adopters. The statistical analysis showed that organizations that have adopted e-commerce did not differ significantly from non-adopters for three of the four owner characteristics: whether the owner was involved in the choice of computers and information technology, had received formal computer training, and owner's highest education level.

Organization Support of E-commerce

Three items were used to measure organization support of e-commerce for research issue five. Based on the summary variable, the difference between adopters and non-adopters was found to be highly significant ($t = 3.699, p = .000$). As might be expected, adopters were more likely to agree that e-commerce was a high priority

in their organization and have devoted resources to the implementation of e-commerce. Even though they differed, neither adopters nor non-adopters appeared to have a long-term strategic plan for e-commerce.

The results were examined for differences within the SME respondents that had already adopted e-commerce. When grouped by e-commerce transaction type, e-commerce adopters that conducted both B2B and B2C transactions tended to have more organizational support than adopters who only conducted B2B transactions. Significant differences were also found when e-commerce adopters were grouped by their use of the Internet. Adopters who only sold online indicated a higher level of organizational support for e-commerce than did adopters who only purchased online.

Institutional Pressure

Research issue six addressed the possible pressure from customers, stakeholders, and competitors that might affect an SME's decision to adopt e-commerce. Upon examining the summary of the six variables used to measure institutional pressure, it was found that adopting organizations do not differ significantly in the institutional pressure to adopt e-commerce from non-adopters. All respondents agreed that customers' needs and remaining competitive were important determinants of e-commerce adoption. All firms also felt that status and perception of the firm were not important adoption determinants.

Relative Advantage and Compatibility

In research issues seven and eight, the study sought to determine if companies who adopt e-commerce differ from non-adopters in their perception of the attributes of e-commerce, specifically relative advantage and compatibility. To measure perception of relative advantage, respondents were asked whether six different benefits could be expected as a result of the implementation of e-commerce. Adopters generally agreed that these were benefits of e-commerce, while non-adopters were closer to neutral. The difference between adopters and non-adopters was very highly significant ($t = 4.23, p = .000$).

Respondents were asked about their perception of the compatibility of e-commerce with their suppliers and customers and with the policies and organizational structure within their organization. Adopters tended to find e-commerce more compatible both internally and externally than non-adopters. The difference between the adopters and non-adopters was very highly significant when looking at their perception of compatibility ($t = 3.778, p = .000$).

Discussion

The results of this study showed no significant difference between adopters and non-adopters when the SMEs were compared based on the size as measured by the number of employees and the business category. These results may indicate that business size will become less of a factor for e-commerce adoption as e-commerce becomes more commonly used by SMEs. The small sample size resulted in a small number of SMEs in each business category and proved difficult to associate industry category with adoption. Even when the businesses were grouped into only three categories (primary, secondary and service) no difference was found between adopters and non-adopters.

SMEs in the Central Okanagan region that had adopted e-commerce tended to be more technological opportunistic by actively seeking intelligence on technological changes, reviewing the effects of technological changes on their business, and did not tend to resist new technologies. These results concur with the few studies that have included this variable. The results for technological readiness found no significant difference between SMEs that had adopted e-commerce and those that had not. This is in contrast to technological innovation adoption studies reviewed that showed that firms that were familiar with and comfortable using computerized systems more readily adopted technological innovations. The results of this study may not have found a difference in technological readiness due to the fact that more and more SMEs are involved and using IT systems to conduct their business. By 2003, seventy-four percent of Canadian SMEs used email and seventy-eight percent were connected to the Internet (Canadian e-Business Initiative 2004). Another possible explanation could be that due to the location of SMEs in the Central Okanagan region, businesses may need to use IT and the Internet more for communication than SMEs located in urban areas. This is confirmed by one of the survey items that asked about the owner's use of computers. Virtually all owners of SMEs that had adopted e-commerce used computers on a daily basis. For owners of non-adopter firms, that figure was still very high, with 73 percent of them using computers on a daily basis.

The factor analysis found that the items used to measure technological opportunism and readiness loaded onto a single factor. Due to this, a single summary variable was calculated that combined technological opportunism and readiness. This combination variable proved to indicate a significant difference between adopters and non-adopters in this study.

In this study there did not prove to be much difference in the characteristics of owners of SMEs that had adopted e-commerce and those that had not. The study examined the owner's involvement in the choice of computers and IT for their firm, the extent of the owner's formal computer training, their use of computers, and their highest education level. The results show that the only significant difference found was in how often the owners use computers. Almost all owners of SMEs that had adopted e-commerce (98%) used computers on a daily basis, compared to 73 percent of non-adopting firm owners. This is consistent with Thong's (1999) findings that the CEO's IS knowledge is positively associated with the SME's decision to adopt IS. To this researcher's knowledge, other than Thong (1999), the owner's computer involvement has not been included in adoption of technological innovation studies. Based on this study, only the owner's frequency of use of computers seems to be related to the adoption of e-commerce.

Organizational support has frequently been shown to positively affect the adoption of technological innovations (Grover 1993, Lertwongsatien & Wongpinunwatana 2003, Tsao, Lin & Lin 2004, Wu, Mahajan & Balasubramanian 2003, Zhuang & Lederer 2004). The technological innovations studied have included EDI, customer-based IOS, and e-commerce. The common rationales provided include influencing the allocation of slack resources and generating enthusiasm and commitment toward changes among organizational members (Lertwongsatien & Wongpinunwatana 2003). Wu, Mahajan and Balasubramanian (2003) point out that e-business may call for significant investments and may significantly alter the existing competitive equilibrium, as problems with channel cannibalization and partner relationships may arise. Seyal and Rahman (2003) found that both management attitude and management support had a positive association with e-commerce adoption by SMEs in Brunei. This study's results agree with the literature reviewed to date. Organizational support was a very highly significant difference between adopter and non-adopter SMEs in the Central Okanagan region, with adopting SMEs showing higher levels of organizational support for e-commerce than non-adopters. E-commerce had been made a higher priority, with resources devoted to its implementation, in SMEs that had adopted e-commerce. Neither adopters nor non-adopters appeared to have a long-term strategic plan for e-commerce. These results show that an innovation still needs a champion in order for successful adoption to occur.

The results show that all respondents agreed that pressure from customers and competitors would influence their decision to adopt e-commerce, but other stakeholders would not influence the decision. However, no significant difference was found between adopters and non-adopters in this influence. It appears that pressure from customers and competitors did or would slightly influence an SME's decision to adopt e-commerce. All respondents agreed that they did or would adopt e-commerce if they were worried about falling behind their competitors. Based on these results the SMEs who have not yet adopted e-commerce must not have received enough pressure from their customers and competitors and do not feel they will lose their edge over competitors by not adopting e-commerce.

Six benefits of e-commerce were used in this study to examine SME's perceptions of the relative advantage of adopting e-commerce. Both adopters and non-adopters agreed that these were benefits of e-commerce but the adopters' agreement was significantly stronger than for the non-adopters. These findings are consistent with e-commerce adoption studies conducted by Ching and Ellis (2004), Kendall et al. (2001), Lertwongsatien and Wongpinunwatana (2003), and Sathye and Beal (2001). The perceived advantages of the innovation were found to be significant determinants of adoption of other technological innovations, such as EDI for Canadian purchasing managers (Chewlos, Benbasat & Dexter 2000) and IS adoption by SMEs (Thong 1999).

Of the six benefits listed in the survey, non-adopters agreed that e-commerce could be expected to streamline their business processes, increase sales, improve service quality to customers, open new distribution channels, and develop new markets, but slightly disagreed with the benefit of reduced costs as a result of e-commerce adoption. Non-adopters may view e-commerce as increasing their costs, and may not be aware of the potential for reduced operating costs for the SME.

Conclusions and Implications

Using these results, the revised model of significant e-commerce adoption factors is shown in Figure 2.

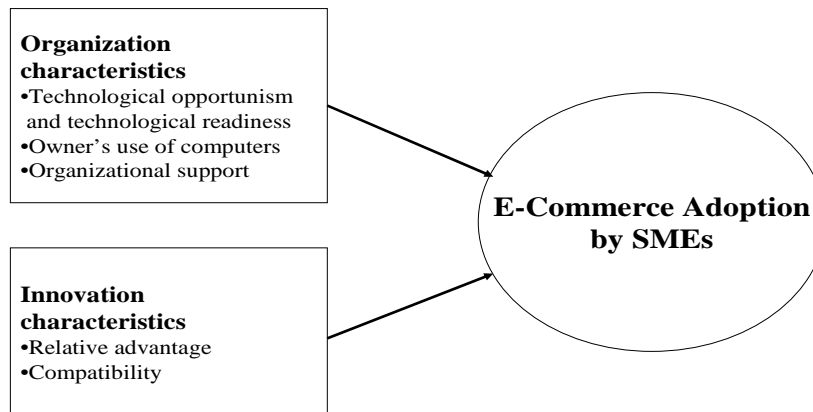


Figure 2: Revised Adoption of E-Commerce Model

Very few innovation adoption studies have examined Canadian SMEs and none have compared Canadian SMEs that have adopted e-commerce to non-adopters. This study expanded and integrated existing theory by developing a unique e-commerce adoption model that has been applied in the Canadian context.

The results of this study could have significant implications for owners of SMEs that have not yet adopted e-commerce and for providers of e-commerce technology and support. Owners/managers of SMEs that have not yet adopted e-commerce will need to become knowledgeable about e-commerce – what potential advantages they can derive from its use, what their competitors are doing in this area. SMEs will need to become more technology-savvy. They will need to become more aware of and begin incorporating technologies available for their business. Resources must be devoted to this area, including the training and development of personnel or the use of external specialists. Support for e-commerce, in the form of allocation of resources and integration of e-commerce in the strategic planning process, must come from the owners of these SMEs.

Both adopters and non-adopters recognized the importance of pressure from stakeholders, such as customers and suppliers. Larger organizations could encourage the use of e-commerce by their SME partners. This might involve working with e-commerce suppliers to ensure that the supply and support provided is appropriate for SMEs. Industry associations can play an important role in facilitating adoption. CeBI (2005) emphasizes a sector-approach to building e-business adoption, suggesting that the private sector, especially large businesses, do more to create an imperative, with appropriate support, to drive e-business use among their SME partners, suppliers, and distributors.

The Canadian government could take an active role in communicating to SME owners the important advantages of e-commerce adoption. SMEs need to better understand the possible benefits of e-commerce adoption and how they can realize these potential benefits. Industry leaders could be used as examples of successful adopters. Canadian SMEs indicated that gathering knowledge about e-business solutions was challenging, despite a wide range of available information, believing that governments, large institutions, consultants and service providers might not be credible sources of information (CeBI 2005) Rather, SME owners looked first to their immediate colleagues and competitors. The government will need to work with the private sector to set up incentive programs that will encourage SMEs to consider adoption of e-commerce. Incentives could take many forms, such as financial, tax rebates, reduced rates for training programs and consulting services.

This study highlights the importance of SMEs being technologically opportunistic and technologically ready. Canada has a strong technological infrastructure and Internet use is high among businesses and households. This research also showed that the owners of SMEs that had already adopted e-commerce used computers daily. Governments could work with educational institutions and the private sector to develop and deliver appropriate training programs. These programs need to be easily accessible with many alternate forms of delivery considered.

Limitations

This study examined e-commerce adoption by SMEs. No single definition exists that is universally acceptable for the terms e-commerce or SME. This lack of a single definition for both e-commerce and SME makes comparisons with other studies difficult. Due to the sample size of 94, it cannot be claimed that the results are generalizable to all SMEs. This study is limited to SMEs located in the Central Okanagan region of British Columbia, Canada. This may limit the ability to generalize the results of the study to all SMEs. Further research could test the model on SMEs outside the region.

The items used to measure compatibility of e-commerce with the firm's business processes and those of its suppliers and customers did not load properly onto a single factor. As a result, it would be advisable to enhance the measurement of compatibility by including additional survey items. Care must be taken to ensure the measurement items used are relevant to SMEs. When conducting the factor analysis, difficulties were found with two of the reverse coded questions. Perhaps it is not good practice to use reverse coded questions for these types of measures.

Implications for Further Research

This study confirms that the innovation adoption model is applicable to the Canadian context. Since the study included only SMEs in the Central Okanagan region, it would be appropriate to now test the model developed in this study to SMEs throughout Canada and internationally. This model included a set of variables used consistently throughout the literature to explain and predict innovation adoption. Further studies could expand the research model and make it more comprehensive by including additional factors. One such factor could be the industry sector in which the SME operates. This would likely have an influence on the reasons for e-commerce adoption and the benefits received.

In recent years, different models and combinations of models have been developed to predict adoption of various technological innovations, such as EDI, interorganizational systems, and e-commerce. This research combined the factors used consistently throughout the literature to develop a model of e-commerce adoption that could be used to guide SMEs, private sector managers and the Canadian government in achieving the goal of increased e-commerce adoption by SMEs.

References

- Baker, C 2000, *Survey of Information and Communications Technologies and Electronic Commerce, 1999*, Statistics Canada.
- CeBI 2005, Canadian e-Business Initiative 2004, *Fast Forward 5.0, Making Connectivity work in Canada*, [Online], Available: http://www.icce.ca/Public/Team1/Docs/fast_foward-en.pdf, [Accessed 4 September 2006].
- Chau, P & Tam, K 1997, 'Factors affecting the adoption of open systems: an exploratory study', *MIS Quarterly*, vol. 21, no. 1, pp. 1-24.
- Ching, H & Ellis, P 2004, 'Marketing in Cyberspace: What Factors Drive E-Commerce Adoption?', *Journal of Marketing Management*, vol. 20, no. 3-4, pp. 409-429.
- Chwelos, P, Benbasat, I & Dexter, A 2001, 'Research Report: Empirical Test of an EDI Adoption Model', *Information System Research*, vol. 12, no. 3, pp. 304-321.
- Croteau, A & Li, P 2003, 'Critical success factors of CRM technological initiatives', *Canadian Journal of Administrative Sciences*, vol. 20, no. 1, pp. 21-34.
- Frambach, R & Schillweaert, N 2002, 'Organizational innovation adoption A multi-level framework of determinants and opportunities for future research', *Journal of Business Research*, vol. 55, no. 2, pp. 163-176.
- Grover, V 1993, 'An empirically derived model for the adoption of customer-based interorganisational systems', *Decision Science*, vol. 24, no. 3, pp. 603-640.
- Henriksen, H 2002, 'Performance, Pressures, and Politics: Motivators for Adoption of Interorganizational Information Systems, PhD thesis, Copenhagen Business School, Denmark.
- Iacovou, C, Benbasat, I & Dexter, A 1995, 'Electronic data interchange and small organizations: Adoption and Impact of Technology', *MIS Quarterly*, vol. 19, no. 4, pp. 465-486.
- Industry Canada 2006, The Digital Economy in Canada, Canadian e-Commerce Statistics [Online], Available: <http://e-com.ic.gc.ca/epic/internet/inecic-ceac.nsf/vwGeneratedInterE/gv00163e.html> [Accessed 10 June 2007].

- Kendall, J, Tung, L, Chua, K, Ng, C & Tan, S 2001, *Electronic Commerce Adoption by SMEs in Singapore*, Proceedings of the 34th Hawaii International Conference on System Sciences.
- Kickul, J & Gundry, L 2001, 'Breaking through boundaries for organizational innovation: new managerial roles and practices in e-commerce firms', *Journal of Management*, vol. 27, no. 3, pp. 347-362.
- Lertwongsatien, C & Wongpinunwatana, N 2003, 'E-Commerce Adoption in Thailand: An Empirical Study of Small and Medium Enterprises (SMEs)', *Journal of Global Information Technology Management*, vol. 6, no. 3, pp. 67-82.
- Ling, C 2001, *Model of Factors Influences on Electronic commerce Adoption and Diffusion in Small- & Medium-sized Enterprises*, Curtin University of Technology, Australia.
- Maxwell, J & Westerfield, D 2002, 'Technological Entrepreneurism Characteristics Related to the Adoption of Innovative Technology', *S.A.M. Advanced Management Journal*, vol. 67, no. 1, pp. 9-15.
- McClellan, R, Johnston, D & Wade M 2002, Net Impact Study Canada The SME Experience [Online], Available: http://www.cebi.ca/410/net_impact.pdf, [Accessed 9 November 2002].
- National Office for the Information Economy (NOIE) 2000, Taking the Plunge – sink or Swim: Attitudes and Experiences of SMEs to E-commerce [Online], Available: <http://www.noie.gov.au/publications/NOIE/SME/SinkorSwim.doc>, [Accessed 20 January 2003].
- Poon, S & Swatman, P M C 1997, 'Small Business Use of the Internet', *International Marketing Review*, vol. 14, no. 4/5, pp. 385-403.
- Porter, M 2001, 'Strategy and the Internet', *Harvard Business Review*, vol. 79, no. 3, p. 62-78.
- Ramamurthy G & Premkumar, G 1995, 'Determinants and Outcomes of EDI Diffusion', *IEEE transactions on Engineering Management*, vol. 42, no. 4, pp. 332-351.
- Rogers, E 1995, *Diffusion of Innovations*, Fourth edition, Free Press, New York.
- Sathye, M & Beal, D 2001, 'Adoption of Electronic Commerce by SMEs: Australian Evidence', *Journal of E-Business*, vol. 1, no. 1.
- Seyal, A & Rahman, M 2003, 'A Preliminary Investigation of E-Commerce Adoption in Small & Medium Enterprises in Brunei', *Journal of Global Information Technology Management*, vol. 6, no. 2, pp. 6-26.
- Srinivasan, R, Lilien, G & Rangaswamy, A 2002, 'Technological Opportunism and Radical Technology Adoption: An Application to E-Business', *Journal of Marketing*, vol. 66, no. 3, pp. 47-61.
- Statistics Canada, The Daily April 20, 2006, *Electronic commerce and technology* [Online], Available: <http://www.statcan.ca/Daily/English/060420/d060420b.htm>, [Accessed 1 June 2006].
- Thong, J 1999, 'An integrated model of information systems adoption in small businesses', *Journal of Management Information Systems*, vol. 15, no. 4, pp. 187-214.
- Tiessen, J, Wright, R & Turner, I 2001, 'A model of e-commerce use by internationalizing SMEs', *Journal of International Management*, vol. 7, pp. 211-233.
- Tornatzky, & Fleischer 1990, quoted in Henriksen, H. 2002, 'Performance, Pressures, and Politics: Motivators for Adoption of Interorganizational Information Systems, PhD thesis, Copenhagen Business School, Denmark.
- Tsao, H, Lin K & Lin, C 2004, 'An investigation of critical success factors in the adoption of B2B EC by Taiwanese companies', *Journal of American Academy of Business*, vol. 5, no. 1, pp. 198-202.
- Wu, F, Mahajan, V & Balasubramanian, S 2003, 'An analysis of e-business adoption and its impact on business performance', *Journal of the Academy of Marketing Science*, vol. 31, no. 4, pp. 425-447.

Zhu, K, Kraemer, K & Xu, S 2003, 'Electronic business adoption by European firms: a cross-country assessment of the facilitators and inhibitors', *European Journal of Information System*, vol. 12, pp. 251-268.

Zhuang, Y & Lederer, A 2004, 'The impact of top management commitment, business process redesign, and IT planning on the B2C e-commerce site', *Electronic Commerce Research*, vol. 4, no. 4, pp. 315-333.

Zikmund, W 2000, '*Business Research Methods*', 6th edn, Dryden Press, Florida.

Appendix 1 – Proposed Factors of e-Commerce Adoption by SMEs

Categories	Variables	Supporting References
Organizational Characteristics	RI1: Organization size & business category	Ling (2001), Saythe & Beal (2001)
	RI2: Technological opportunism	Srinivasan, Lilien and Rangaswamy (2002), Wu, Mahajan, & Balasubramanian (2004)
	RI3: Technological readiness	Grover (1993), Iacovou, Benbasat & Dexter (1995), Srinivasan, Lilien and Rangaswamy (2002),
	RI4: Owner characteristics	Ching & Ellis (2004), Croteau & Li (2003), Thong (1999), Tsao, Lin & Lin, (2004), Zhuang & Lederer (2004)
	RI5: Organizational support	Grover (1993), Lertwongsatien & Wongpinunwatana (2003), Tsao, Lin & Lin (2004), Wu, Mahajan & Balasubramanian (2003), Zhuang & Lederer (2004)
Environmental Characteristics	RI6: Institutional pressure	Chwelos, Benbasat & Dexter (2001), Ling (2001), Iacovou, Benbasat & Dexter (1995)
Innovation Characteristics	RI7: Perceived relative advantage	Ching & Ellis (2004), Frambach & Schillewaert (2002), Kendall et al. (2001), Rogers (1995), Saythe & Beal (2001), Thong (1999)
	RI8: Compatibility	Ramamurthy & Premkumar, Ching & Ellis (2004), Thong (1999)

Appendix 2 – Survey Items and Measurement Scales

Survey question	Measurement Scale
Section A: Use of Electronic Commerce	
A1. Progress of company with respect to implementation of e-commerce	Ordinal 4 point
A2. Online business transactions, B2B, B2C, other.	Nominal 3 point
A3. Internet use: purchase, sell, both.	Nominal 3 point
A4. Our firm conducts its business: online only/online & traditional	Nominal 2 point
A5. Year our firm started using e-commerce	Ordinal 6 point
Section B: Reasons for e-Commerce Adoption	
B1. To satisfy the needs of our major customers	7 point Likert
B2. Demands by some of our major customers that we implement e-commerce	7 point Likert
B3. Our customers' need would not influence the design of our e-commerce initiative	7 point Likert
B4. To confer status for our company with our stakeholders	7 point Likert
B5. To avoid the perception by our stakeholders that our firm is technologically backward	7 point Likert
B6. To avoid losing our edge over competitors	7 point Likert
B7. To keep ahead of our competitors' e-commerce capabilities	7 point Likert
B8. The fact that most of our suppliers and customers have implemented e-commerce	7 point Likert
B9. E-commerce adoption necessitates a change in the company's policy and structure	7 point Likert
Section C: Technological Factors	
C1. The first in industry to detect technological developments that affect our business	7 point Likert
C2. We actively seek intelligence on technological changes in the business environment	7 point Likert
C3. We are often slow to detect changes in technologies that might affect our business	7 point Likert
C4. We periodically review the likely effect of changes in technology on our business	7 point Likert
C5. We generally respond very quickly to technological changes in the environment	7 point Likert
C6. This firm lags behind the industry in responding to new technologies	7 point Likert
C7. For one reason or another, we are slow to respond to new technologies	7 point Likert
C8. We tend to resist new technologies that cause our current investments to lose value	7 point Likert
C9. Our business unit lags behind industry in the implementation of IT systems	7 point Likert
C10. Our business unit uses state-of-the-art information technology systems	7 point Likert
C11. Relative to major competitors, our IT implementation is very advanced	7 point Likert
C12. E-commerce is regarded as a high priority in this organization.	7 point Likert
C13. Our business has a long-term strategic plan for e-commerce.	7 point Likert
C14. The necessary resources are provided for implementing e-commerce.	7 point Likert

Survey question	Measurement Scale
C15. A list of benefits expected as a result of the implementation of e-commerce.	7 point Likert
Section D: Company and Owner Information	
D1. The owner involved in choice of computers and information technology	Yes/no
D2. The owner has received some formal training in computers	Yes/no
D3. The owner uses computers (frequency)	4 point ordinal
D4. The owner's highest education level	3 point ordinal
D5. Number of employees in company	4 point ordinal
D6. Length of time company has been in business	4 point ordinal
D7. Industry category of business	Choice of 20

Copyright

Lynn Sparling, Mark Toleman and Aileen Cater-Steel © 2007. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.