USING CASES TO EXPLAIN ELECTRONIC COMMERCE ADOPTION AND SUCCESS IN SMALL AND MEDIUM-SIZED ENTERPRISES

Electronic Commerce (EC) is becoming an increasingly important activity in small and medium-sized enterprises (SMEs). This paper presents a model of the factors influencing the levels of EC adoption and EC success in SMEs. Case studies of five SMEs in the IT industry were used to explore two constructs in the EC literature: (1) EC adoption and (2) EC success. Both were found to be relevant and worthy of further research to develop valid and reliable instruments for their measurement. In addition, the case studies highlighted the relationship between levels of EC adoption and EC success in SMEs.

Introduction

Electronic commerce (EC) is an increasingly important part of the Canadian economy. In 2000, over 26% of all enterprises had a website, up from 22% in 1999 (Petersen, 2001). Based on the Petersen (2001) study, the percentage of companies using the Internet rose from 53% in 1999 to 63% in 2000. These companies represent 90% of Canadian economic activity. The value of orders received through the Internet rose 73% in 2000 to over $7.2 billion. In addition, 18% of firms purchased goods and services over the Internet in 2000, an increase from 14% in 1999.

Although commerce through the Internet channel has increased, the proportion of firms selling goods and services on the web declined from 10% in 1999 to 6% in 2000 (Petersen, 2001). In 2000, almost one third of companies with over 500 employees sold goods and services over the Internet. The percentage for companies with less than 20 employees was only 6% (Petersen, 2001). These numbers are symptomatic of the challenges many small and medium sized enterprises (SMEs) face in adopting electronic commerce. Although 83% of SMEs in Canada believe the Internet will have a positive impact on their business (SES Canada Research, 2001), only 35% of firms with less than 100 employees are on-line (BCG, 2001).

EC adoption by Canadian SMEs has also been slow in comparison to US firms (BCG, 2001). In 1999, only 35% of Canadian firms with less than 100 employees had an on-line presence versus 57% in the U.S. Additionally, 92% of U.S. firms between 100 and 499 employees had a web presence in 1999, whereas, only 76% of Canadian firms between 100 and 499 had a web presence (BCG, 2001). Government task forces have recognized the importance of supporting EC in the Canadian economy and have offered a series of recommendations to support electronic commerce in Canadian SMEs (BCG, 2001).

The relatively low rate of adoption of EC by Canadian SMEs suggests these firms face significant and unique challenges in adoption. Prior research has indicated SMEs encounter constraints with respect to the skills, time and staff necessary for planning major information technology (IT) projects that large companies do not experience (Cohn, 1972; Thong, 1999). This

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1 This research is supported by the Social Sciences and Humanities Research Council of Canada. The authors would like to recognize the help provided by Michael Brown.
2 SMEs are defined in this paper as companies with less than 100 employees. As a reference see http://www.ifc.org/sme/html/sme_definitions.html.
is reaffirmed by Ivis (2001), where barriers to SME adoption include the need to educate managers regarding risks and returns related to EC, and a general lack of knowledge of how to implement technology and EC strategy.

It is important to develop an understanding of the factors that influence EC adoption and EC success: only once facilitators and inhibitors are properly understood, can SMEs benefit from the full potential of EC (MacKay et al. (2001(b)). The present study sought to extend previous research by gaining a better understanding of two relatively new constructs in the EC literature (1) EC adoption and (2) perceived EC impact as a measure of EC success in SMEs (MacKay et al., (2001(b)).

We use the following definition of electronic commerce adopted from Zwass (1996): “the sharing of business information, maintaining business relationships, and conducting business transactions by means of Internet-based technology”. The conceptual model guiding this study is described in the next section.

Conceptual Model

By combining empirical findings from various areas in the literature, it was possible to build a preliminary model showing factors influencing EC adoption and EC success in SMEs. The specific form of the model was derived from recommendations by Iacovou et al. (1995), Mehrten et al. (2001), and MacKay et al. (2001(a)). In a study of small firm adoption of Electronic Data Interchange (EDI), Iacovou et al. (1995) suggested that the level of external pressure, perceived benefits, and organizational readiness significantly influenced the level of EDI adoption in small firms. Mehrten et al. (2001) developed a model of Internet adoption by SMEs that was similar in form to the EDI adoption model. MacKay et al. (2001(a)) developed and tested a model of the factors that influence the intention to adopt EC in SMEs. Hence the model in Figure 1 would suggest that:

- Perceived outcomes affect EC adoption;
- Organizational Readiness affects EC adoption;
- Pressure affects EC adoption; and
- EC adoption affects EC success.

**Figure 1. Conceptual Model**
In this study, only the EC Adoption and EC Success constructs were investigated. Therefore, only a brief explanation of the other model elements will be presented. A more complete review is provided in McKay et al. (2001(b)).

**Perceived outcomes** refer to the benefits (Abell & Black, 1997; MacKay et al., 2001(b); Poon, 2000) and risks (Abell & Lim, 1996; Nolan Norton Institute, 1998; Walczuch et al., 2000; Zwass, 1996) perceived by adopters of electronic commerce.

**Organizational Readiness** includes top management support (Auger & Gallaugher, 1997; Harrison et al., 1997; Mehrten et al., 2001; Poon, 2000; Premkumar & Roberts, 1999; Thong, 1999), IT competence (Lai, 1994; Mehrten et al., 2001; Thong, 1999; Winston & Dologite, 1999), and organizational resources (Auger & Gallaugher, 1997; Premkumar & Roberts, 1999).

**Pressure** includes issues relating to demands made upon the firm by external or internal parties (Auger & Gallaugher, 1997; Mehrten et al., 2001; Poon, 2000; Premkumar & Roberts, 1999; Rhodes & Carter, 1998).

**Electronic Commerce Adoption**

Models of electronic commerce adoption indicate firms usually progress through stages of maturity (Cooper & Burgess, 2000; Ho, 1997; Nambisan & Wang, 1999). Cooper and Burgess (2000) state firms move through three stages: promotion, provision, and processing. As a firm moves through each stage, its site becomes more sophisticated, offering the audience more information and increasingly integrating the site into the company’s information systems. Nambisan and Wang state that there are three levels of increasingly sophisticated adoption: information access, work collaboration, and business transactions. Nolan Norton Institute (1998) classifies adopters into leaders and followers depending on whether they had realized new profits from their electronic commerce initiatives.

**Electronic Commerce Success**

The success of electronic commerce adoption relates to the benefits firms experience as a result of electronic commerce adoption (Poon, 2000). Benefits can include lower costs, increased market share, increased revenue, and contribution to the overall success of the business (MacKay et al., 2001(b)). Several studies have shown that as firms use electronic commerce for business tasks, some form of financial improvements are likely to occur (Abell & Lim, 1996; Poon, 2000; Zwass, 1996). Poon and Swatman (1998) reported that small firms experienced unexpected new business opportunities through their electronic commerce initiative. These unexpected opportunities usually arose from customer inquiries outside of the country in which the firm operates. As a result, a firm could expand market share globally. This suggests that as firms adopt electronic commerce and develop more sophistication in their offerings, the firms will experience increased success.

Our long-term research goal is to gain a better understanding of the factors that influence EC adoption and EC success in SMEs (MacKay et al. (2001(a); 2001(b)). However, the present study sought to extend previous research by focussing on the following three objectives for this paper: (1) to clarify the nature of the EC adoption construct; (2) to clarify the nature of the EC success construct, and (3) to explore the relationship between EC adoption and EC success. The research method is described below.

**Research Method**

The qualitative method of case study research is particularly appropriate for studying phenomena that are not supported by a strong theoretical base (Eisenhardt, 1989; Yin, 1989). Thus, a case study research strategy was chosen for the data collection in this study.
The overall case study design included a single, exploratory, in-depth pilot case study followed by a more explanatory, cross-case analysis of five firms (Yin, 1989). The study used five IT case firms, which is within the range recommended by Eisenhardt (1989). Firms were considered “adopters” of EC if the firm had a website. The study was carried out in Vancouver, Canada and the case firms were selected according to the following criteria: (1) EC adopter (i.e., had a company website); (2) Included in the IT industry; (3) SMEs with under 100 employees; (2) Independent (i.e., not a subsidiary).

Data was primarily collected from face-to-face interviews with the top managers responsible for making EC decisions. In total, six top managers from five different companies were interviewed (i.e., three presidents and three VPs Business Development). The data collection was based on the approach advocated by Yin (1989). An interview guide was constructed to investigate the constructs and relationships in the research model (Figure 1). The interviews consisted primarily of open-ended questions. All interviews were taped and transcribed and lasted an average of one hour. The transcripts were analyzed for patterns and then coded (Miles & Huberman, 1984). An analysis of company websites was also used to confirm data related to levels of EC adoption. The results related to levels of EC adoption and EC success are provided below.

Case Study Results

Table 1 contains descriptive information on the companies included in the sample. The results are based on the data collected from five IT case studies (referred to as firms A, B, etc). All firms had less than 100 employees and were in the IT industry conducting business-to-business (B2B) EC through company websites. The case studies revealed that one senior executive in each firm was clearly the sole or primary decision maker regarding the company website. Typically, the website decision maker was either the company president (i.e., for firms with less than 20 employees) or the VP of Business Development (i.e., for firms with over 20 employees).

Table 1. Characteristics of Companies in the Sample

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Firm A</th>
<th>Firm B</th>
<th>Firm C</th>
<th>Firm D</th>
<th>Firm E</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Industry</td>
<td>Web Solution Provider</td>
<td>Web Solution Provider</td>
<td>Develops &amp; sells hardware and software for the K-12 classroom.</td>
<td>Web Solution Provider</td>
<td>Develops &amp; sells scouting software and scheduling software</td>
</tr>
<tr>
<td>Product or Service Type</td>
<td>Service/Consulting</td>
<td>Service/Consulting</td>
<td>Product</td>
<td>Service/Consulting</td>
<td>Product</td>
</tr>
<tr>
<td>Title of EC Decision Maker</td>
<td>VP Business Development</td>
<td>President</td>
<td>VP Business Development</td>
<td>President/VP Business Development</td>
<td>President</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>34</td>
<td>11</td>
<td>65</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Age of Website</td>
<td>5 yrs</td>
<td>6 yrs</td>
<td>5 yrs</td>
<td>6 yrs</td>
<td>2.5 yrs</td>
</tr>
</tbody>
</table>

EC Levels of Adoption and Perceived EC Impact

The cross-case analysis showed that Nambisan and Wang (1999) model provided the best explanatory framework for the levels of EC adoption. According to Nambisan and Wang (1999),
three increasing levels of EC adoption can be identified including information access, work collaboration and core business transactions. The authors state that organizations may find it relatively easy to adopt EC at the information access level. However, EC adoption at higher levels calls for tighter integration of the technology with the business context.

The case study data suggested that a finer gradation of the Nambisan and Wong model was required to fully describe EC adoption. Two levels of information access were found – Basic and Enhanced – and two levels of work collaboration – Internal and External. The firms had moved through these levels of EC adoption at different speeds, according to their own needs and likely the needs of their industry. Based on responses offered by the five IT case firms, the following four increasing levels of EC adoption were identified:

**Level 1: Basic Information Access (Electronic Brochure).** The first level is about rudimentary information access. All firms were using their websites for disseminating information to internal and external parties (e.g., customers, employees, potential employees).

“It’s primarily being used as a marketing vehicle for us. I do think that customers should be able to come back to the site and see what we’re up to and what kind of new projects we’ve been doing, as well as just general information about the company”.

**Level 2: Enhanced Information Access (Product and Service Demonstrations).** The second level is about enhanced information access. Firms A and E used their websites to showcase their products and/or services. For example, Firm A (a web solution provider) used the company website to showcase their web development capabilities.

“I wouldn’t maybe call it Best of Breed in North America, but it certainly is a leading website for a small boutique shop”.

Firm E used the company website to conduct product demonstrations by phone to replace costly face-to-face product demonstrations.

“We needed another approach that instilled some confidence in the people we were talking to. We developed some slide shows in the web pages, so we could phone them up, and walk them through slide shows, particularly if it’s a speaker phone or conference call”.

Firms B, C and D did not use their websites to showcase their products and/or services.

**Level 3: Internal Work Collaboration (Intranet)** The third level is about web-enablement of internal processes. Firms A and B used an Intranet extensively to facilitate project teamwork, internal operations (e.g., time tracking, invoicing) and knowledge management.

“There is a very elaborate intranet, an employee portal, and that adds a whole lot of different dimensions. It’s much, much larger than the customer facing website. For example, it has a large calendar, it has time sheets tracking, a library of technical references, and recently, we added a knowledge management system”.

Firm C had an intranet in place but it was not being used extensively. Firm D used an intranet to facilitate project teamwork and internal operations but did not use their Intranet as a knowledge management tool. Firm E did not have an Intranet.

**Level 4: External Work Collaboration (Customer Extranet)** The fourth level is about web-enablement to integrate customers with core business functions. Firms A and B used a customer extranet extensively as a post-sales vehicle to facilitate project management (i.e., communication and document sharing) with customers.

“This is a facility only available to customers who have projects that are up and running and that is an environment where all project information is published. The goal of this is that I should be able to take an outside person, not involved or
knowledgeable in the project, give them the url for the extranet, and in one hour, they should be able to figure out what the project is, how it’s being done, and what the current status is”.

Firm C had an extranet in place but it was not being used extensively. Firms D and E did not have an extranet.

Table 2 shows a ranking of EC adoption in the cases; firms are ranked in order of highest to lowest EC adoption levels. Firm A had the highest EC adoption level because this firm was ranked highly on four levels of EC adoption. Firm E had the lowest EC adoption level because this firm had only achieved Levels 1 and 2 adoption levels. None of the firms in the sample were using their websites to directly support financial transactions.

Table 2. Measuring Levels of EC Adoption

<table>
<thead>
<tr>
<th>Level of EC Adoption</th>
<th>Firm A</th>
<th>Firm B</th>
<th>Firm C</th>
<th>Firm D</th>
<th>Firm E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1: Electronic Brochure</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Level 2: Product/Service Demonstrations</td>
<td>High</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>High</td>
</tr>
<tr>
<td>Level 3: Intranet</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>Level 4: Customer Extranet</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Overall EC Adoption Level</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

EC success in the IT case firms

EC success was measured by perceived impact of EC on the organization. Perceived EC impact refers to the perceived actual benefits realized by EC adoption in the five IT firms. All five companies indicated that no formal performance measures were put in place to measure the impact of their EC efforts. For example, the President of one of the Web Solution Provider case firms responded as follows:

“I don’t believe there are any performance measures.”

Similarly, a Vice President of Business Development indicated:

“I don’t think I’ve ever gone through the exercise of trying to measure what the actual value is”.

Although no formal EC-related performance measures were identified, firms often gave many examples of perceived EC impacts resulting from their levels of EC adoption. Based on responses offered by the five IT case firms, four increasing levels of perceived EC impacts were identified. The most common responses at each of the four levels of EC adoption were:

**Level 1:** (Electronic Brochure). The most common Level 1 response indicated that the company website increased credibility with existing and potential customers.

“if you can’t list 50 or 100 clients that you’ve done work for, then you don’t have the kind of credibility that’s going to allow you to pick up larger and more conservative clients”.

**Level 2:** (Product and Service Demonstrations). The most common Level 2 response indicated that the company website reduced product/service demonstration costs.

“it saved us two tickets to lots of places in NA every time, and for a small company, we just can’t afford that kind of reach”.

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Level 3: (Intranet). The most common Level 3 response indicated that the company intranet improved knowledge management. “we call it expertise management: the goal is to reuse, so what you need to know is, who wrote them, where are they, how they can be adapted to this project, and who is the right person to go and talk to about them.”

Level 4: (Customer Extranet). The most common Level 4 response indicated that the company extranet reduced project management costs. “it absolutely reduces the cost of project management and client management. It allows customers who have people on the project team in different parts of the world to actually go on and review pieces of code that have been built or a project charter or a weekly status report, rather than getting everybody in a room.”

Table 3 itemizes the responses to open-ended questions relating to perceived EC impact in order of most common to least common response.

Table 3. Perceived EC Impact in Five IT Case Studies
(Listed in Order of Most Common to Least Common Response)

<table>
<thead>
<tr>
<th>INFORMATION ACCESS (BASIC &amp; ENHANCED)</th>
<th>WORK COLLABORATION (INTERNAL &amp; EXTERNAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 (Electronic Brochure)</td>
<td>Level 3 (Intranet)</td>
</tr>
<tr>
<td>Firms: A, B, C, D, E</td>
<td>Firms: A, B, C, D</td>
</tr>
<tr>
<td>1. Increased credibility with existing and potential customers</td>
<td>1. Improved knowledge management</td>
</tr>
<tr>
<td>2. Improved company image</td>
<td>2. Improved project time tracking</td>
</tr>
<tr>
<td>3. Improved marketing</td>
<td>3. Improved document management</td>
</tr>
<tr>
<td>4. Increased knowledge of existing customers</td>
<td>4. Improved work collaboration</td>
</tr>
<tr>
<td>5. Increased knowledge of potential customers</td>
<td>5. Improved project management</td>
</tr>
<tr>
<td>6. Attracted new customers</td>
<td></td>
</tr>
<tr>
<td>7. Expanded sales to NA and international markets</td>
<td></td>
</tr>
<tr>
<td>8. Increased sales</td>
<td></td>
</tr>
<tr>
<td>9. Increased overall business</td>
<td></td>
</tr>
<tr>
<td>10. Increased customer satisfaction</td>
<td></td>
</tr>
<tr>
<td>11. Increased visibility</td>
<td></td>
</tr>
<tr>
<td>12. Increased customer trust</td>
<td></td>
</tr>
<tr>
<td>13. Increased ability to compete</td>
<td></td>
</tr>
<tr>
<td>14. Reduced marketing material costs</td>
<td></td>
</tr>
<tr>
<td>15. Attracted new employees</td>
<td></td>
</tr>
</tbody>
</table>

| Level 2 (Product and Service Demonstrations) | Level 4 (Customer Extranet) |
| Firms: A and E                              | Firms: A, B, C            |
| 1. Reduced product/service demonstration costs | 1. Reduced project management costs |
| 2. Reduced travel costs                     | 2. Reduced client management costs |
| 3. Increased customer confidence in product/service | 3. Reduced paperwork |
| 4. Attracted new customers                  | 4. Improved Client relationships |
| 5. Expanded sales to NA and international markets | 5. Improved Client Retention |
| 6. Increased ability to compete             |                                        |

Linking EC levels of adoption and Perceived EC Impacts

Based on their comments and the classification in Table 3, the firms are ranked in order of highest to lowest overall perceived EC impact level in Table 4. For example, Firm A had the highest overall perceived EC Impact because this firm was ranked highly on all four levels of perceived EC impact. Firm B was ranked highly on three levels of perceived EC Impact involving both information access (Level 1) and work collaboration (Levels 3 and 4). Firm C achieved high
levels of perceived EC impact related to basic information access (Level 1) but low levels of EC impact related to the use of their company Intranet (Level 3) and customer extranet (Level 4). Firm D achieved high levels of perceived EC impact from basic information access (Level 1) and low levels of perceived EC impact from their company Intranet (Level 3). Firm E achieved high levels of perceived EC impact related to basic and enhanced information access (Levels 1 and 2).

Table 4 also shows that the two firms that had the highest levels of overall perceived EC impact (Firms A and B) also had the highest EC adoption levels. Firms C, D and E, which had low levels of perceived EC impact, also had low EC adoption levels.

Table 4.  EC Adoption Level and Perceived EC Impact

<table>
<thead>
<tr>
<th>Variable</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC Adoption Level</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Overall Perceived EC Impact</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Discussion and Implications for Research and Practice

These cases validated and expanded the Nambisan and Wang (1999) model of EC adoption in SMEs. More cases are needed to explore the last stage of adoption, core business transactions. In addition, the measures must be tested in both large and small firms to ensure they are appropriate.

The cases also created a preliminary taxonomy of EC success. From this data, we conclude that increased credibility with customers, lower product demonstration costs, improved knowledge management, and lower project management costs are key benefits of EC adoption. More cases are necessary to develop this taxonomy and then a large sample study is needed to test the relative incidence and importance of each outcome.

Although our case-based investigation has provided preliminary findings on the relationship between EC adoption and perceived EC impact in SMEs, longitudinal investigations would allow researchers to provide needed insights about the causality between EC adoption and perceived EC impact.

Other industries might not move through the levels of EC adoption and perceived EC impact as quickly as the IT industry in Canada; further research is needed to gain a better understanding of EC adoption and EC success in other industries and countries.

This research can be useful to top managers in SMEs who wish to gain the greatest value from EC. The perceived EC impact framework provides a useful tool in recognizing and understanding the potential EC impact levels in SMEs. Top managers can evaluate each impact by asking if they want EC to provide it in their organization. If they do, they can further consider the levels of EC adoption that would be required to realize the desired level of EC impact.

The EC impact framework could serve as an evaluation tool for assessing the impact of existing EC investments. It can also serve as an excellent starting point for the analysis of the potential impacts of any new investments related to increasing EC adoption levels. Given that SMEs have a strong reliance on external service providers for their EC initiatives (MacKay et al., 2001(b)), it should also help web solution providers and other related external service providers to increase their sales success by focusing on EC impacts that are of pressing concern for top management in SMEs.
Conclusions

The aim of the study was to: (1) to clarify the nature of the EC adoption construct, (2) to clarify the nature of the EC success construct, and (3) to explore the relationship between EC adoption and EC success. Case studies of five IT firms revealed four increasing levels of EC adoption and four increasing levels of perceived EC impact. In addition, the results suggest a positive relationship between EC adoption and EC impact. Further research is required to develop valid and reliable instruments for the measurement of EC adoption and EC success and to gain a better understanding of the relationship between these two constructs. These results also support the call for more efforts to be directed at initiatives by management in SMEs to increase levels of EC adoption in order to maximize their EC investments.

References


