Strategic Value and Adoption of Electronic Commerce:
An Empirical Study of Chilean Small and Medium Businesses

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ABSTRACT

By combining 2 independent research streams, we attempt to identify specific relationships between a manager's perceptions of the strategic value of e-commerce and the variables that may influence e-commerce adoption. Eighty-three top managers/owners of small and medium size companies in Chile participated in the study. The results corroborate previous theory that posits several factors as determinants of the strategic value of e-commerce in other information technologies as well as factors that may influence e-commerce adoption. In addition, we found a significant relationship between the strategic value of e-commerce and e-commerce adoption. Factor analysis was conducted in order to test the measurement model while canonical analysis was employed to test the structured model.

KEYWORDS

E-Commerce, Adoption, Developing Countries

INTRODUCTION

Even though the Internet has existed for several decades, electronic commerce (e-commerce) has become a reality only with the development of the World Wide Web (WWW) (Napier, Judd, Rivers, & Wagner, 2001). E-commerce, as defined by Schneider and Perry (2000), is the "business activities conducted using electronic data transmission via the Internet and the WWW". Among the benefits, it has been suggested that e-commerce reduces costs, improves product quality, helps in reaching new customers or suppliers, and creates new ways of selling existing products (Schneider & Perry, 2000; Napier et al. 2001; Chaudhury & Kuilboer, 2002; Saloner & Spence, 2002). These benefits are being achieved in both developed and developing countries (Huff, Wade, Parent, Schneberger & Newson, 2000). Many South American countires, for example, have started to provide its citizenry with access to the Internet and to promote electronic business.

The National Science Foundation (NSF) authorized the Chilean Internet connection in the early 1990s. Based on an NSF grant, the Catholic University at Santiago was the first organization to get connected to the Internet in 1992 (Arriagada, 2001). According to CyberAtlas, an Internet based company that maintains an updated list of

the latest statistics on Internet users around the world, Chile had registered 7 Internet Server Providers (ISPs) and 1.8 million Internet users by July 2001 which represents 11.7 percent of its population. Even though this percentage is high when compared with Internet users in other developing countries in South America, e-commerce in Chile has not been fully developed (Cubillos, 2001). Thus, the major inquiry of this study is to find answers to questions such as: What are the perceptions of Chilean managers about the strategic value of e-commerce? Do managers know and understand the potential factors that influence e-commerce adoption? Do managers in small and medium size businesses have the resources and the desire to adopt e-commerce?

To construct the proposed model, we identified factors that were found to be influential in previous research concerned with the perception of strategic value in other information technologies: *operational support, managerial productivity*, and *strategic decision aid*. Regarding the factors that influence e-commerce adoption, we identified and organized factors that were found to be significant in prior research about technology adoption: *organizational readiness, external pressure, perceived ease of use,* and *perceived usefulness*. The development and validation of the proposed model is important not only for Chilean managers but also for managers in other developing countries who can make better decisions when facing e-commerce adoption.

The rest of this paper is presented as follows. First, we briefly review related studies. Based on these studies, we propose a predictive model for the perceived importance and adoption of e-commerce. Along with this, we state the research questions we will explore. Then we describe our research design, perform data analysis, and present the results. Finally, we conclude the study and indicate its limitations, implications, and future research opportunities.

LITERATURE REVIEW

This study represents a fusion of two independent research streams developed over the last decade. The first stream can be characterized as discovering the strategic value of certain information technologies as seen by top managers. The second stream identifies factors that influence the adoption of information technology. The former has been studied by Subramanian and Nosek (2001) and others (e.g. Barua, Kriebel & Mukhopadhyay, 1995; Tallon, Kraemer, & Gurbaxani, 2000; Chan, 2000) while the latter has been investigated by Davis (1989) and others (e.g. Adams, Nelson & Todd, 1992; Venkatesh and Davis, 1996; Lederer, Maupin, Sena & Zhuang, 2000) primarily through intention models such as the Technology Acceptance Model (TAM).

Perceived Strategic Value of Information Technologies

A vast number of studies regarding strategic value of information technology (IT) have been carried out over the past decade. These studies have mainly focused on the relationship between IT investment and firm performance. For example, Hitt and

23

Brynjolfsoon (1996) investigated how IT affects productivity, profitability, and consumer surplus. They found that IT increases productivity and consumer surplus but does not necessarily increase business profits. This interesting finding leads us to conclude that IT investments are important to maintain competitive parity but do not necessarily support competitive advantage. Similar results were found in Barua et al.'s study (1995) where they concluded that the productivity gains from IT investments have been neutral or negative. In another study, Tallon et al. (2000) measured IT payoffs through perceptual measures. They argued that executives rely on their perceptions in determining whether or not a particular IT investment creates value to the firm. Personal experience and peer evaluations were found to be important determinants of IT value.

Few studies have focused on identifying the perceptions of top management regarding the strategic value of e-commerce. The study by Amit and Zott (2001) is one of the few that has tried to deal with this issue. Even though they focused their analysis on e-business, their results can be generalized to e-commerce since e-commerce is viewed as part of e-business (Huff et al. 2000). Based on literature in entrepreneurship and strategic management, Amit and Zott developed a value-drivers model which includes four factors that were found to be sources in value creation of e-commerce: transaction efficiency, complementarities, lock-in, and novelty. They also pointed out that "the greater the transaction efficiency gains that are enabled by a particular e-business, the lower the cost and hence the more valuable it will be" (p. 503). Some of these factors were also confirmed in Saloner and Spence's (2002) work. For example, Saloner and Spence pointed out that the most important area in which e-commerce will create value is in reducing transaction costs involved in bringing buyers and sellers together.

In a more specific study about IT, Subramanian and Nosek (2001) created an instrument to validate the strategic value that information systems (IS) may provide. Through an empirical study of 73 firms they identified three factors that were found to create strategic value of IS: operational support, managerial productivity, and strategic decision aid. In each of these constructs, they utilized different items that were found to have high convergent validity and reliability. The factors tested in Subramanian and Nosek's work seems to be applicable to other IT, especially to e-commerce. Due to the lack of research in identifying factors that create strategic value of e-commerce, Subramanian and Nosek's model was utilized in this current study.

Information Technology Adoption

The seminal work of Davis (1989) has set the basis for later studies in the area of information technology adoption. He proposed the TAM which has been tested in numerous studies (e.g. Adams et al. 1992; Hendrickson, Massey & Cronan, 1993; Szajna, 1994; Igbaria, Zinatelli, Cragg & Cavaye, 1997; Subramanian, 1998). Lederer et al. (2000) summarized sixteen articles published from 1991 to 1999 in leading MIS journals that have tested the TAM model for different technologies (e.g. ATM, e-mail,

24

Netscape, Access, Internet, Word, and Excel). TAM has been shown to explain a significant amount of the variance in intentions to use a technology and/or actual use of the technology. In Lederer et al.'s model, they considered beliefs about ease of use and perceived usefulness as the major factors influencing attitudes toward use, which, in turn, affect intentions to use.

Many other studies have attempted to describe the factors influencing technology adoption. The findings vary according to the type of technology addressed. For example, Beatty, Shim, and Jones (2001) studied factors influencing corporate web site adoption. They found that the factors involved in the adoption process differ depending on the time in which the technology has been adopted. In their empirical study of 286 medium-to-large US firms, they found that early adopters placed significantly more emphasis on perceived benefits for having a Web site than later adopters. The earliest adopters viewed using the Web as being more compatible with their current organizational processes and systems, and existing technological infrastructure. Firms that adopted corporate web sites much later appeared not to have placed as much emphasis on benefits, and adopted in spite of the lack of compatibility between the Web and their existing technology and organizational norms.

Similarly, Iacovou, Benbasat and Dexter (1995) studied the factors influencing the adoption of electronic data interchange (EDI). They considered seven organizations in different industries that were pursuing an EDI initiative. Among the factors included were perceived benefits, organizational readiness, and external pressure. To measure perceived benefits, they used awareness of direct and indirect benefits. Variables measuring organizational readiness were financial and technological resources. In order to measure external pressure, they considered competitive pressure and imposition by partners. In a very similar study, Chwelos, Benbasat and Dexter (2001) considered the same constructs influencing the adoption of EDI. The variables measuring the main constructs were slightly different though. For example, they considered the trading partner as influencing external pressure and readiness. External pressure was considered to be influenced by the dependency on trading partner and enacted trading partner power. In a similar line of inquiry, Kuan and Chau (2001) determined the factors influencing the adoption of EDI in small businesses using a technology, organization, and environment framework. The technology factor, as in Iacovo et al.'s (1995) study, incorporated perceived direct and indirect benefits of EDI. The organization factor consisted of perceived financial cost and perceived technical competence. The environment factor included a new variable: perceived government pressure.

Adoption of computer-aided software engineering (CASE) has also been addressed in the information technology adoption literature. Premkumar and Potter (1995) examined the impact of various organizational and technology characteristics on the adoption of CASE tools. Within the organizational factors, they considered top management support, product champion, and IS expertise. The variables included in the technical factor were relative advantage, cost, complexity, technical compatibility, and organizational compatibility.

25

In a study by Chang and Cheung (2001), the determinants of the intention to use an information technology such as the Internet/WWW were established. Instead of determining the factors affecting adoption, they studied those affecting the intention to use the Internet/WWW. The factors considered included near and long-term consequences, complexity, affect, social factors, and facilitation conditions. Complexity and long-term consequences were not found to influence the intention to adopt the Internet/WWW.

Similarly, Chin and Gopal (1995) determined the relative importance of beliefs of group support systems (GSS). They examined how relative advantage, ease of use, compatibility, and enjoyment influenced the intention to adopt GSS. Their work was similar to that of Davis (1989) and Beatty et al. (2001) in the first three constructs. Enjoyment, however, is considered as a new factor influencing the intention to adopt GSS. They draw upon Davis, Bagozzi and Warshaw's (1992) work to define enjoyment: "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences" (p. 47). They found that beliefs about technology are also effective in explaining GSS intention to adopt. The factor found to be the most influential in GSS adoption was relative advantage: "the extent to which an innovation is perceived as being better than its precursor" (p. 47).

The emerging field of e-commerce has not been left behind in the analysis of adoption. However, few studies have addressed this issue. One of these is the study by Mirchandani and Motwani (2001). They investigated the factors that differentiate adopters from non-adopters of e-commerce in small businesses. The relevant factors included enthusiasm of the top management, compatibility of e-commerce with the work of the company, relative advantage perceived from e-commerce, and knowledge of the company's employees about computers. Factors found not to be influential include the degree of dependence of the company on information, managerial time required to plan and implement the e-commerce application, the nature of the company's competition, and the financial cost of implementing and operating the e-commerce application.

In a another study investigating e-commerce development in China, Stylianou, Robbins and Jackson (2003) surveyed MBA students / managers about their perceptions and attitudes regarding e-commerce. The study focused on environmental factors such as electronic payment infrastructure, government regulations and telecommunications; organizational factors such as executive support, use of information technology and investment in e-commerce; and personal factors such as IT knowledge, e-commerce knowledge and e-commerce communication. Stylianou, Robbins and Jackson found that most of the respondents believe that structural deficiencies will hinder e-commerce development, but that stronger managerial leadership and e-commerce awareness will allow many companies in China to overcome these obstacles.

Table 1 summarizes the factors involved in the process of technology adoption according to the previous literature review:

Table 1. Summary of Key Factors Influencing Information Technology Adoption

Technology	Factors	Source
Application programs	Perceived ease of use Perceived usefulness Attitude toward use	Davis (1989)
Corporate Web site	Organizational compatibility Technical compatibility Perceived benefits Top management support Complexity	Beatty, Shim, and Jones (2001)
Electronic Data Interchange (EDI)	Perceived benefits Organizational readiness External pressure	Iacovo, Benbasat, and Dexter (1995) Chwelos, Benbasat, and Dexter (2001)
Electronic Data Interchange (EDI)	Technology Organization Environment	Kuan and Chau (2001)
Computer Aided Software Engineering (CASE)	Technology (relative advantage, cost, complexity, technical and organizational compatibility) Organizational (top management support, product champion, IS expertise)	Premkumar and Potter (1995)
Internet/WWW	Near, long-term consequences Complexity Affect Social factors Facilitating conditions	Chang and Cheung (2001)
Group Support Systems (GSS)	Relative advantage Ease of use Compatibility Enjoyment	Chin and Gopal (1995)
Electronic Commerce	Relative advantage Compatibility with company Knowledge of IT / e-commerce within the company Leadership / vision of top managers Infrastructure IT / e-commerce investment	Mirchandani and Motwani (2001) Stylianou, Robbins, and Jackson (2003)

RESEARCH MODEL

Based on the literature review of the perceptions of strategic value and adoption of e-commerce, we propose the following model:
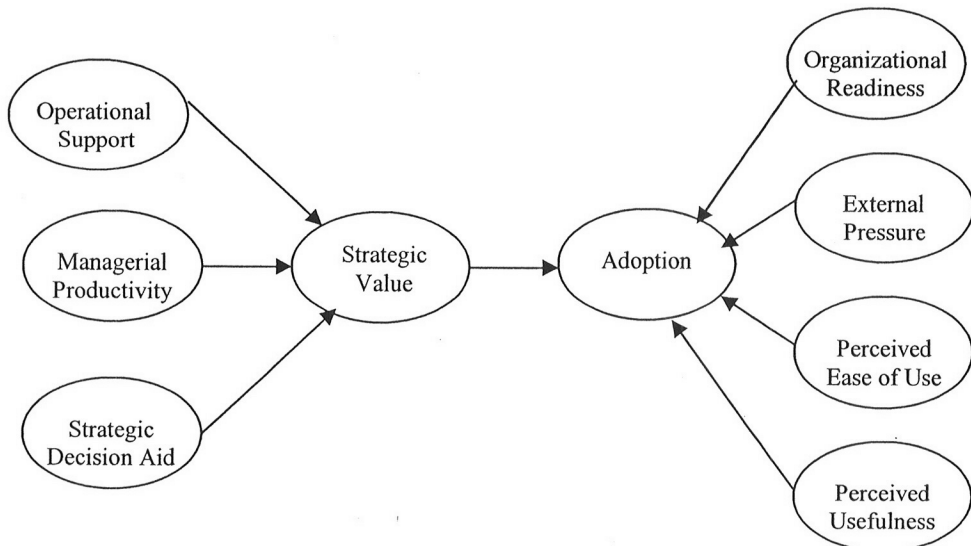
27

Figure 1. The Proposed Research Model

Perception of Strategic Value of E-commerce

Based on Subramanian and Nosek (2001), we considered three major variables as determinants of perceived strategic value of e-commerce: operational support, managerial productivity, and strategic decision aids. Since the instrument utilized by Subramanian and Nosek was found to have high reliability (Cronbach alpha= 0.82) and convergent and discriminant validity, we used the same sub-constructs to measure the strategic value construct. *Operational support* is a variable that measures how e-commerce may reduce costs, improve customer services and distribution channels, reap operational benefits, provide effective support role to operations, support linkages with suppliers, and increase ability to compete. *Managerial productivity* refers to how e-commerce may enhance access to information, provide a means to use generic methods in decision-making, improve communication in the organization, and improve productivity of managers. Finally, *strategic decision aids* influence managers' strategic decision-making, top managers decision-making, industry cooperative partnerships, and availability of information.

Factors Influencing Adoption of E-commerce

Based on prior research (see table 1), we identified factors found to be influential in the adoption of different information technology and grouped them into four different sub-constructs: *organizational readiness, external pressure, perceived ease of use, and perceived usefulness*. Iacovo et al. (1995), Chwelos et al. (2001), Mirchandani and Motwani (2001) and Stylianou, Robbins and Jackson (2003) identified organizational readiness as one of the factors that influence technology adoption. We assess this sub-construct by including two items about the financial and technological resources that the company may have available to adopt. Factors assessing how compatible and consistent e-commerce is with firm's culture, values, and preferred

28

work practices; existing technology infrastructure; and top management's enthusiasm to adopt were also included in this category. These items were found relevant in previous research by Beatty et al. (2001), Premkumar and Potter (1995), Chin and Gopal (1995), and Mirchandani and Motwani (2001).

External pressure was assessed by incorporating five items found to be influential in previous research related to information technology adoption: competition, social factors, dependency on other firms that were already using e-commerce, the industry, and the government (Iacovo et al. 1995; Chwelos et al. 2001; Chang and Cheung 2001).

Davis (1989) defined perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort" (p. 320). We considered a subset of Davis' instrument to measure this construct and modified them to make them specifically relevant to e-commerce. Similarly, he defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320). We utilized the six items defined by Davis and accommodated them according to this research.

Survey Instrument

Three top managers participated in a pilot of the survey instrument. One of the authors observed the pilot subjects as they completed the survey. Feedback from the subjects resulted in minor changes to the survey instructions and translations to the Spanish language. Participants in the study were required to complete the survey that had the following major sections:

- Seven demographic questions about the respondent's gender, age, education, position, functional area, years of work in present position, and years of work within present firm.

- Four general questions about the firm: total number of employees, total number of IS employees, percent of firm's budget allocated to IS, and industry in which the firm operates.

- Eight questions about the technology in the organization: hardware platform, number of PCs currently present in the firm, presence of Internet Server Provider, network connection, presence of web site and utilization of e-commerce, and operating systems.

- Fifteen questions about the extent to which e-commerce is perceived as contributing to strategic value of the firm.

- Twenty-three questions about factors involved in e-commerce adoption.

29

A seven-point Likert scale (from strongly disagree to strongly agree) was utilized to measure the questions regarding perceived strategic value and adoption of e-commerce. The survey was accompanied by a cover letter that provided a brief definition of e-commerce. A postage-paid return envelope was also included.

Research Questions

The questions we explore in this research are related to the validation of the proposed model and the relationship between perceived strategic value and the adoption of e-commerce:

1. What are the determinant factors of the perceived strategic value of e-commerce in small and medium size businesses in Chile?

2. How do the perceptions of strategic value, as viewed by Chilean managers, influence their decision to adopt e-commerce?

3. What are the factors involved in the decision to adopt e-commerce by Chilean managers?

METHODOLOGY

Subjects

We targeted owners and/or top managers of small and medium size business in the Bio-Bio region of Chile. Different criterion have been utilized to determine a small or medium size business. In our study, we considered the number of employees as the principal criteria since other categorizations such of those involving revenue, total capital, and so on, are more difficult to obtain and can result in misleading classifications of organizations. The number of employees considered in a small or medium size business varies according to the agency providing the definition. For example, the U.S. Small Business Administration (http://www.sba.gov) uses a cutoff of fewer than 500 employees. Harrison, Mykytyn and Riemenschnerder (1997) as well as Iacovo et al. (1995) utilized a cutoff of 200 employees to make reasonable comparisons to prior studies involving IT and small businesses. For the purpose of this study, we have used the cutoff for small and medium size businesses suggested by the U. S. Small Business Administration (less than 500 employees).

Data Collection

The data for this study were gathered by means of a survey administered during Spring 2002. The gathering process was carried out in two steps. First, a sample of 130 small and medium size businesses in the Bío-Bío region of Chile was selected from a guide of enterprises of the Bio-Bio region (GEEP, 2002). Follow-up telephone calls were made in order to ensure that the surveys were received by targeted mail addresses. During this first step, we realized that not all the surveys had been

delivered due to changes in mail addresses. Therefore, we resent 30 surveys to those organizations that did not receive the survey via the first mailing.

During the second step, 80 more surveys were mailed to different companies selected from the same enterprise guide (GEEP, 2002). The same procedure was followed to ensure that the surveys were delivered and to ascertain top managers' willingness to participate. In addition, through one author's personal contacts, it was possible to send 30 more surveys to other firms that were not targeted in either the first or second mailing.

RESULTS

Using the process described above, a total of eighty-eight surveys were returned over a twelve-week period. After an initial review, five surveys were dropped from the study because they did not meet the initial requirements of firm size. Thus, eighty-three companies provided usable data which represents a 34 percent response rate. We attribute this high response rate to personal contacts via telephone calls we made in order to ascertain top managers' willingness to participate in the study. It is interesting to note that some managers were reluctant to take part in a study that was conducted through an American university; others were extremely enthusiastic to participate.

Demographics and Descriptive Statistics

The results indicate that the majority of top managers (90%) are owners or CEOs of small and medium size businesses. These individuals are well educated with over 68.67% holding a 4-year college degree. The majority are male (94%) with an average age of 41 years. Table 2 shows other demographics of the respondents: the industry in which the company operates, the hardware platform, the presence of Internet service provider, and the presence of a web site and e-commerce.

Table 2. Demographics of Study Respondents

Gender:	Male=94%	Female=6%
Age:	Average= 40.67	S.D.= 9.87
Years of work in present position:	Average= 9.55	S.D.= 7.89
Years of work with present firm:	Average= 11.07	S.D.= 9.35
Education	High School	4.82%
	2-year College	26.51%
	4-year College	62.65%
	Master Degree	4.82%
	Doctoral Degree	1.2%
Industry	Manufacturing	4.82%
	Wholesale	20.48%
	Retail	21.69%

	Healthcare	4.82%
	Construction	13.25%
	Transportation	1.20%
	Other (forestry, fishing, services, and others)	33.73%
Hardware platform	Mainframe	3.61%
	Mini	1.2%
	PC	65.06%
	Mixture	25.30%
	Other	4.82%
Internet Service Provider already in place	Yes	87.95%
	No	12.05%
Firm web site	Yes	48.19%
	No	51.81%
Electronic commerce already in place	Yes	15.66%
	No	84.34%

Statistical Analysis

In order to test the proposed model, statistical analysis was conducted in two stages. The first step employed confirmatory factor analysis to determine whether the number of factors and loadings of items involved in the two main constructs of this study (perceived strategic value and adoption) conformed to the model. With this analysis, we found answers to research questions 1 and 3 stated in the Research Model section.

Since we were also interested in exploring how the perceptions of strategic value influence the decision to adopt e-commerce (research question 2), canonical analysis was utilized in the second step. In general terms, canonical analysis technique involves developing a linear combination of independent variables (strategic value variables) and dependent variables (adoption variables) to maximize the correlation between the two sets (Johnson and Wichern, 1998). MIS research has benefited from the use of this multivariate technique (see for example Koh and Watson, 1998; Byrd and Turner, 2001). Campbell and Taylor.(1996) demonstrated that canonical analysis subsumes other statistical procedures (t-test, Pearson correlation, multiple regression, ANOVA, MANOVA, and discriminant analysis).

Green, Halbert and Robinson (1966) suggested the use of canonical correlation in combination with other multivariate techniques for more efficient analysis. For example, one could first conduct a factor analysis on each set of dependent and independent variables and then run a canonical analysis on the principal components. We followed Green et al.'s (1966) recommendation and conducted the analysis in two stages:

Stage 1: Confirmatory Factor Analysis

a) Perceived Strategic Value Construct

A confirmatory factor analysis was run using SPSS 10. All the items measuring perception of strategic value of e-commerce were considered during the first run and resulted in items that did not load on the intended factors. Thus, some items were dropped from the analysis. The resulting items were subjected to another confirmatory factor analysis resulting in a model with a better fit. The items considered in the final instrument for the perceived strategic value construct are shown in Appendix A.

The factor analysis used principal component extraction in order to extract the maximum variance from the items. To minimize the number of items which have high loadings on any given factor, varimax rotation was utilized. The extracted Eigenvalues were over 1. The results of this confirmatory factor analysis resulted in 3 factors loading cleanly with a total explained variance of 73.73%. Table 3 shows the rotated component matrix respectively.

Table 3. Rotated Component Matrix – Strategic Value Factors

		Component		
		1	2	3
Organizational Support	OS2	.057	.179	.860
	OS3	.393	-.027	.785
	OS6	.041	.559	.581
Managerial Productivity	MP1	.547	.359	.434
	MP2	.639	.316	.217
	MP3	.914	.057	.089
	MP4	.837	.239	.177
Decision Aids	DA1	.601	.635	.084
	DA2	.553	.716	.117
	DA4	.151	.852	.134

Convergent and discriminant validity were assessed using factor analysis. Convergent validity is demonstrated if the items load strongly (>0.50) on their associated factors. Discriminant validity is achieved if each item loads stronger on its associated factor than on any other factor (Hair, Anderson, Tatham & Black, 1998). Table 3 shows that all items loaded stronger on their associated factors than on other factors. Thus, convergent and discriminant validity are demonstrated.

Construct reliability or internal consistency was assessed using Cronbach's alpha. Table 4 below shows that alpha values ranges from .72 to .85. Construct reliability is deemed to be sufficient for all factors.

33

Table 4. Reliability Analysis – Strategic Value Factors

Construct		Cronbach's alpha
Operational Support	(OS)	.72
Managerial Productivity	(MP)	.83
Decision Aids	(DA)	.85

b) Adoption Construct

The adoption construct was initially comprised of 23 items. In order to test how these items loaded, a factor analysis was performed. Principal component extraction with varimax rotation and required Eigenvalues above 1 were considered. As in the case of the perceived strategic value construct, the first run resulted in items that did not load on the intended factors. Thus, some items were dropped from the analysis. The resulting items were subject to another confirmatory factor analysis resulting in a model with better fit.

The results of this confirmatory factor analysis resulted in 5 factors loading cleanly with a total explained variance of 76.0%. Thus, we revised the proposed model and considered a fifth factor, which we named "compatibility", that better described the items used (Figure 2 shows the revised research model). The results from this factor analysis are quite interesting. Previous research found compatibility an important factor that influenced the adoption of information technologies (Beatty et al., 2001; Mirchandani and Motwani, 2001; Premkumar and Potter, 1995; Chin and Gopal, 1995). In our study, compatibility emerged freely as a significant independent factor.
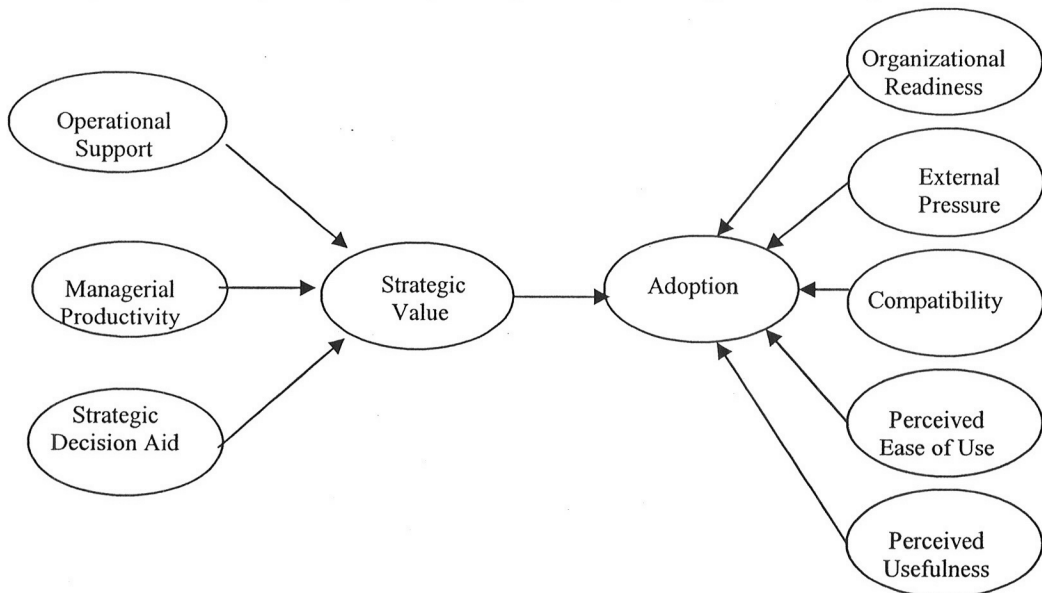
Figure 2. The Revised Research Model

The items considered in the final instrument are shown in Appendix B. The results of this confirmatory factor analysis resulted in 5 factors loading cleanly with a total explained variance of 76.03%. Table 5 shows the rotated component matrix:

Table 5. Rotated Component Matrix – Adoption Factors

		Component				
		1	2	3	4	5
Organizational Readiness	OR1	.049	.055	-.002	.089	**.885**
	OR2	.089	.074	.217	.195	**.841**
Compatibility	C1	.122	.063	**.887**	.125	.111
	C2	.144	.099	**.916**	.141	.075
	C3	.305	.018	**.842**	-.035	.063
External Pressure	EP1	.298	.090	.340	**.593**	-.121
	EP2	.206	.152	.329	**.584**	.296
	EP3	.415	.005	.105	**.612**	.197
	EP4	.472	-.120	.177	**.560**	.118
	EP5	-.022	-.174	-.193	**.638**	.097
Ease of Use	EU1	.061	**.917**	.075	-.017	-.068
	EU2	.447	**.582**	.197	.045	.042
	EU4	-.008	**.916**	.094	-.042	.179
	EU5	.145	**.909**	-.072	-.065	.042
Perceived usefulness	PU1	**.731**	.275	.245	.243	-.032
	PU2	**.925**	.185	.081	.111	.039
	PU3	**.925**	.070	.129	.133	.042
	PU4	**.918**	.094	.120	.166	.081
	PU5	**.822**	-.009	.223	.076	.185
	PU6	**.878**	.049	.095	.216	-.051

Convergent and discriminant validity were achieved as in the case of the perceived strategic value construct. Table 5 shows that all items have loading > 0.5 with 7 items greater than .9. They also loaded stronger on their associated factors than on other factors. Thus, convergent and discriminant validity was demonstrated. Table 6 shows that alpha values ranges from .72 to .95 for the perceived usefulness of e-commerce factor. Thus, construct reliability is proved to be sufficient for all factors.

Table 6. Reliability Analysis – Adoption Factors

Construct		Cronbach's alpha
Organizational Readiness	(OR)	.77
Compatibility	(C)	.91
External Pressure	(EP)	.72
Ease of Use	(EU)	.88
Perceived Usefulness	(PU)	.95

Stage 2: Canonical Analysis

Canonical analysis is a multivariate statistical model that studies the interrelationships among sets of multiple dependent variables and multiple independent variables (Hair et al., 1998; Stevens, 2002; Johnson and Wichern, 1998). By simultaneously considering both multiple dependent and independent variables, it is possible to control for moderator or suppressor effects that may exist among various dependent variables (Mahmood and Mann, 1993).

In canonical analysis, there are r criterion variables (dependent variables) and s predictor variables (independent variables). The maximum number of canonical correlations (functions) between these two sets of variables is the number of variables in the smaller set (Green et al. 1966; Johnson and Wichern, 1998; Stevens, 2002). In our case, the number of variables for the perception of strategic value is 3 while the number of variables in the adoption construct is 5. Thus, the number of canonical functions extracted from the analysis is 3 which corresponds to the smallest set of variables.

In order to test the significance of the canonical correlations we looked at two different measures: 1) the significance of the F value given by Wilk's lambda, Pillai's criterion, Hotteling's trace, and Roy's gcr (Hair et al., 1998) and 2) the measures of overall model fit. Table 7 below shows the corresponding multivariate test of significance with 15 degrees of freedom (3x5) while Table 8 shows the measures of overall model fit in the three canonical functions. Note that the strength of the relationship between the canonical covariates is given by the canonical correlation (Hair et al., 1998).

Table 7. Multivariate Test of Significance

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.56847	3.60037	15.00	231.00	.000
Hotellings	1.01391	4.97944	15.00	221.00	.000
Wilks	.47514	4.27883	15.00	207.44	.000
Roys	.47843				

Table 8. Measures of Overall Model Fit

Canonical Function	Canonical Correlation	Canonical R2	F Statistic	Probability
1	.692	.478	4.27883	.000
2	.277	.077	.90671	.513
3	.115	.013	.34255	.795

Even though the multivariate test of significance shows that all the tests are statistically significant at the .05 level, from the overall model fit we conclude that only the first canonical function represents a significant value (p<.01). This conclusion is consistent with the canonical R2 values shown in Table 8. For these

36

data, in the first canonical correlation, the independent variables explain 48% of the variance in the dependent variables; the second canonical correlation explains 8%, and the third one explains only 1%. This is not unusual since typically the first canonical correlation is far more important than the others (Johnson and Wichern, 1998; Campbell and Taylor, 1996).

This finding indicates that the perception of strategic value, as perceived by Chilean managers, and the adoption of e-commerce were significantly connected via the first canonical function. Thus, the rest of the study is based on the interpretation of this first canonical function. Table 9 shows the summary of standardized canonical coefficients (canonical weights) and canonical loadings for the first canonical function considering both independent and dependent variables.

Due to the pattern of results in canonical weights and canonical loadings (see Table 9), we opted to interpret the final results based on the canonical loadings. The rationality of this choice is the fact that the interpretation of canonical weights is subject to some criticism (Thompson, 1991). For example, Hair et al. (1998) stated, "a small weight may mean either that its corresponding variable is irrelevant in determining the relationship or that it has been partialed out of the relationship because of a high degree of multicollinearity" (pp. 453). Canonical weights are also considered to have low stability from one sample to another (Hair et al., 1998).

Table 9. Standardized Canonical Coefficients and Canonical Loadings

Construct	Variable	Canonical Weights	Canonical Loading
Perceived Strategic Value			
	OS	.081	.570
	MP	.483	.906
	DA	.558	.925
Adoption			
	OR	.201	.449
	C	.560	.825
	EP	.032	.616
	EU	-.128	.239
	PU	.565	.813

The canonical loadings measure the linear correlation between the independent variables and their respective canonical variates. These can be interpreted like factor loadings (Hair et al., 1998). Table 9 shows that all the canonical loadings are significant for the independent variables (cut off >.3 according to Green et al., 1978; Ma and Bateson, 1999; and Byrd and Turner, 2001). The rank order of importance (determined by the absolute value of the canonical loadings) for the perceived strategic value of e-commerce is decision aids (DA), managerial productivity (MP), and organizational support (OS). Similarly, the rank of importance for the adoption construct contributing to the first canonical function is compatibility (C), perceived

37

usefulness (PU), external pressure (EP), and organizational readiness (OR). Ease of use of e-commerce was found not to be influential in the adoption of e-commerce.

LIMITATIONS AND FUTURE RESEARCH

Generalizations from this research should be made with caution. A major limitation in our study corresponds to the number of employees considered in each company. Our sample is mainly comprised by companies whose number of employees varies between 10 and 200. Only 5 firms had more than 200 employees. This implies that the sample may be biased toward smaller firms and, therefore, the results may not be generalized to larger firms.

It is important to also mention that this research could be strengthened by utilizing a larger sample size. Even though the sample size in this study meets the minimum requirements of 10 observations per variable for canonical analysis to be employed, increasing the sample size would increase the power of the analysis.

The uniqueness of this study, gathering together two different streams of research, generates many opportunities for future research. First, in order to corroborate the results of this current study and to create a broader, cumulative knowledge of the relationship between perceived strategic value and adoption of e-commerce, it would be desirable to reproduce this research. As Adams et al. (1992) pointed out "the tendency of IS researchers to become complacent or discouraged with progress in a specific area after conducting what would be considered a limited number of studies in other domains should be challenged. We should begin to focus on replication, refinement, and development of models and measures" (p.245). Thus, by using the same proposed model, this research could be replicated by using a different sample in other developing or developed countries.

Second, a discriminatory analysis to identify the factors that differentiate between adopters from non-adopters in small and medium sized companies could also be conducted in the future. The results from this suggested analysis could be compared with previous research which tried to determine discriminant factors between adopters and non-adopters in certain information technology.

Third, it would be also interesting to extend this study to determine the relationship between the total number of employees, information systems budget, number of information systems department employees (if any), and the extent to which the firms have adopted e-commerce. Findings regarding this proposed study could help to determine the state-of-the-art of e-commerce adoption in small businesses and determine what will be the tendency of e-commerce adoption in the future.

CONCLUSIONS

Through this study, we have built a model that explains how strategic value of e-commerce, as perceived by Chilean top managers, influences managers' attitude

toward e-commerce adoption. The findings within this study suggest that strategic value, as perceived by Chilean managers, and the adoption of e-commerce are positively and significantly connected. These results imply that managers must believe that e-commerce can add strategic value to their organization before they undertake an e-commerce initiative.

Among the factors proposed as determinants of e-commerce adoption, *compatibility, perceived usefulness, external pressure,* and *organizational readiness* were found to be statistically significant as determinants of e-commerce adoption. Compatibility between e-commerce and firm's culture, values, and preferred work practices turned out to be the most influential ones as perceived by Chilean managers. Regarding the findings on *perceived usefulness, external pressure*, and *organizational readiness*, our study validated the importance of these determinants as found in other information technology adoption studies (Davis, 1989; Iacovo et al., 1995; and Chwelos et al., 2001).

The findings of this study suggest that managers/owners of SMEs must take proactive steps to ensure that e-commerce "fits" within their organization. Possible actions that should be taken include eduation of company employees about e-commerce, what it is, possible benefits associated with e-commerce and how it may change their working environment. It is also important for managers/owners of SMEs to commit to the e-commerce initiative by investing in information technology infrastructure whether it be hardware, software, or technical training. Being proactive in preparing workers within the organization for an e-commerce initiative are critical components to its success.

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40

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41

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Appendix A: Final Items Considered in the Perceived Strategic Value Construct

Perceived Strategic Value		
Organizational Support	OS2	Improve customer service
	OS3	Improve distribution channels
	OS6	Increase ability to compete
Managerial Productivity	MP1	Provide managers better access to information
	MP2	Provide managers access to methods and models in making functional area decisions
	MP3	Improve communication in the organization
	MP4	Improve productivity of managers
Decision Aids	DA1	Support strategic decisions for managers
	DA2	Help make decisions for managers
	DA4	Provide information for strategic decision

42

Appendix B: Final Items Considered in the Adoption Construct

Adoption		
Organizational Readiness	OR1 OR2	Financial resources to adopt e-commerce Technological resources to adopt e-commerce
Compatibility	C1 C2 C3	With culture With values With preferred work practices
External Pressure	EP1 EP2 EP3 EP4 EP5	Competition is a factor in our decision to adopt e-commerce Social factors are important in our decision to adopt e-commerce We depend on other firms that are already using e-commerce Our industry is pressuring us to adopt e-commerce Our organization is pressured by the government to adopt e-commerce
Ease of Use	EU1 EU2 EU4 EU5	Learning to operate e-commerce would be ease for me It would be ease for me to become skillful at using e-commerce I would find e-commerce easy to use I would find e-commerce easy to use
Perceived Usefulness	PU1 PU2 PU3 PU4 PU5 PU6	Using e-commerce would enable my company to accomplish specific task more quickly Using e-commerce would improve my job performance Using e-commerce in my job would increase my productivity Using e-commerce would enhance my effectiveness on the job Using e-commerce would make it easier to do my job I would find e-commerce useful in my job

43