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A Test of the Theory of Planned Behavior in an International Context using Structural Equation Modeling

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ABSTRACT

The Theory of Planned Behavior (TPB) has been widely used to predict behavioral intention of different kinds. However, there is a lack of studies that have measured the factorial structure of the TPB instrument. In addition, findings that apply to one context may not be appropriate in different settings. Thus, it is important to focus on measurement and instrument development issues to contribute to theory building. Based on a sample of 210 managers/owners of small and medium sized businesses in Chile, this research uses confirmatory factor analysis (CFA) and structural equation modeling (SEM) to test the underlying factor structure and assess reliability and validity of the TPB instrument. The results provides support for a revised TPB model which explains eighty-one percent of the variance in intention by using attitudes, subjective norms, and perceived behavioral control variables. Thus, the evidence supports the use of an eleven-item instrument when applying the TPB in this international context.

Keywords

Theory of planned behavior, e-commerce, international context, structural equation modeling, SMEs.

INTRODUCTION

As Sethi and King (1994) pointed out, the advancement of the IS field depends upon giving priority to measurement and instrument development. The field of information systems has started to pay greater attention to this issue in the last two decades. For example, Bagozzi (1982) studied the role of measurement in theory construction and stated that theory construction and cumulative tradition, the ultimate objectives of the field, are inseparable from measurement. Ives and Olson (1984) surveyed 22 studies concerning user involvement and its relationship to IS success and found that the majority of these studies used inadequate measurement. Moore and Benbasat (1991) developed an instrument to measure the various perceptions that an individual may have about adopting an IT innovation. They clearly pointed out that “inadequate measurement of constructs have plagued IS research in a wide variety of topics” (p. 193).

The acceptance of the Theory of Planned Behavior’s instrument (Ajzen, 1991), which has been widely used in American settings (Harrison et al., 1997; Riemenschneider, et al., 2003; Venkatesh, et al., 2003), as a standardized instrument requires confirmation that it explains and measures the attitude, subjective norm, perceived behavioral control, and intention constructs accurately in an international context. By using e-commerce as the target technology, the objective of this research, is to validate the structure and dimensionality of the Theory of Planned Behavior’s instrument and test its applicability in a developing country. Hofstede’s (1997, 2001) research on cultural dimensions provides a theoretical underpinning that may help to explain differences in e-commerce adoption between developed and developing countries.

THEORETICAL BACKGROUND

The Theory of Planned Behavior (TPB) – Model and Determinants

The TPB states that behavior (B) is a direct positive function of behavioral intention (BI) and perceived behavioral control (PBC). PBC influences behavior indirectly through intentions as well as directly when the person does not have complete control over that behavior and when the individual’s perceptions of control are accurate (Madden, Ellen, & Ajzen, 1992). The direct effect of PBC on behavior and its indirect effect through intentions are graphically shown on Figure 1. As Taylor and Todd (1995a) pointed out, behavior is a weighted function of intention and PBC ($B = w_1BI + w_2PBC$). Behavioral intention (BI) is determined by one’s attitude (A), subjective norm (SN), and perceived behavioral control (PBC). Attitude

toward the behavior refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior in question. Subjective norm refers to the perceived social pressure to perform or not to perform the behavior while perceived behavioral control reflects an individual's perceptions that there are a few, if any, personal and situational impediments to the performance of the behavior. Thus, according to the TPB, BI can be written as a weighted function of A, SN, and PBC ($BI = w_1A + w_2SN + w_3PBC$).

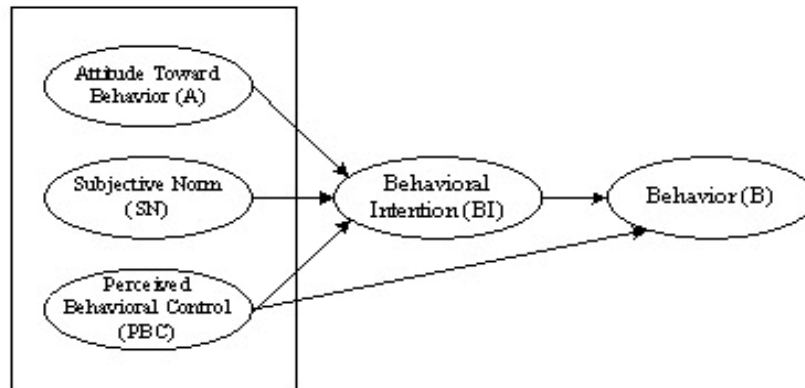


Figure 1: Model of the Theory of Planned Behavior (Ajzen, 1991)

E-commerce and E-commerce Adoption

E-commerce is defined as “business activities conducted using electronic data transmission via the Internet and the World Wide Web” (Schneider & Perry, 2000, p. 388). Based on this broad definition, in this study we did not distinguish between B2C (“transactions conducted between shoppers and businesses on the Web”, Schneider, 2002, pp. 521) and B2B (“transactions conducted between businesses on the Web”, Schneider, 2002, pp. 521).

As was mentioned earlier, it is important to determine whether e-commerce adoption research that has been conducted mostly in American settings applies to different cultures of the world. Differences in Hofstede's cultural dimensions between a developing country as Chile and a developed country as the USA may influence, to a certain extent, e-commerce adoption perceptions. Among these cultural dimensions, it seems that uncertainty avoidance and individualism/collectivism have the most direct bearing on e-commerce adoption intention. According to Hofstede's classification, US culture may be more prone to risk taking and willingness to assume changes. Chile, on the other hand, exhibits a culture that is less prone to risk taking and, in general terms, may avoid changes. The incorporation of a new technology, such as e-commerce, brings structural changes and redesign of organizations (Laudon & Laudon, 2004). In addition, American culture is distinguished by being individualistic, which may dictate the willingness of managers/owners of SMEs toward adopting e-commerce. For some, e-commerce may be seen as an impersonal way to conduct businesses which may not be the way a collectivistic culture see business relationships. The TPB has been applied to American firms and proved to have a good explanatory power (Harrison et al., 1997; Riemenschneider, Harrison, & Mykytyn, 2003; Taylor & Todd, 1995a). Thus, determining the extent to which this theory applies to a collectivist culture with high uncertainty avoidance index is still an issue.

RESEARCH METODOLOGY

The subjects for this research were top managers/owners of small and medium sized businesses (SMEs) in the capital city of Santiago, the Bío-Bío, and the Ninth regions of Chile. The number of full-time employees was considered as the principal criteria utilized to determine the size of a SME. The corporation for promoting the national productive activity in Chile (CORFO) defines SMEs as those that have between 10 and 200 employees (CORFO, 1994, p. 13).

Ajzen (1991) provided guidelines to carry out the procedure for generating the instrument to test the TPB and these guidelines were used in the present study to generate the instrument. After generating the questionnaire, the back-translation procedure (Brislin, Lonner, & Thorndike, 1973) was utilized to translate the survey instrument from English to Spanish. As in the case of Cheng and Stockdale (2003), a bilingual student translated the questionnaire from English to Spanish. A second bilingual student blindly translated the Spanish version of the instrument back to English. The two English versions were compared to validate the accuracy of the translation process. Adjustments were made to make sure that the English meaning of the questions was not lost in the translation process. After two iterations, the translated versions were regarded as equivalent. Then, the instrument was pilot tested by eight Chilean managers/owners.

In order to obtain reliable, internally consistent measures of the four constructs involved in the theory (attitude, subjective

norm, perceived behavioral control, and intention), Ajzen (2002) suggested selecting appropriate items at the initial stages of the investigation. The items included in the questionnaire (Appendix A) were adapted from the study by Riemenschneider et al. (2003) and were customized to reflect the specific target behavior, the intention to adopt e-commerce by managers/owners of SME in Chile. All of the items were measured by a 7-point Likert scale ranging from strongly agree to strongly disagree. Model testing proceeded in two stages: confirmatory factor analysis was used to test the measurement model for all four constructs, followed by full structural model testing examining the causal paths between the latent constructs.

DATA ANALYSIS AND RESULTS

After generating the questionnaire and pilot testing it, a random sample of 1,100 SMEs was selected from various business directories and surveys were mailed to each business. These SMEs were mostly concentrated in Santiago and metropolitan areas in the Bío-Bío and Ninth regions of Chile. Contact persons in these regions made an initial follow-up telephone call to non-respondents two weeks after the surveys were sent, a second follow-up telephone call two weeks after the first one, and a third follow-up telephone call two weeks after the second follow-up telephone call. Thirty-five surveys were not delivered due to incorrect mail addresses. As a result, 228 surveys were returned over a 12-week period which represents a response rate of 20.27%. Sixteen cases were dropped from the sample due to incomplete data. Therefore, 212 cases were considered for further analysis.

Most of the respondents were male (73%) with ages ranging from 30 to 50 years (66%). Education levels revealed that 53% of the respondents had a 4-year college degree and 28% had a 2-year college degree. Firm's characteristics revealed that 77% of the companies had between 10 and 100 employees and 33% had between 101 and 200. Fifteen percent of the firms belonged to the retail sector while 12% to the wholesale. Seventy-six percent of the firms responded that they already had access to the Internet and 62% indicated that they already had a web site which was mainly used to collect data (29.2%), promote products or services (49.5%), and provide customer service (32.5%). All the respondents were senior managers or owners of SMEs.

Reliability and Validity of Measurement Scales

Reliability is a fundamental issue in measurement that needs to be carefully addressed. To examine the reliability of measurement scales for the four constructs described in the previous section, Cronbach's alpha was calculated using SPSS 12. Table 1 shows the values of Cronbach's alpha when considering all the initial indicators in each scale as well as the combination of indicators that maximize the value of alpha. As can be seen from the table, all of the measurement scales obtained an acceptable level of alpha coefficient greater than .70, which indicates that the measurement scales are reliable and appropriate for further analysis. Particularly, intention and subjective norm showed the highest reliability when including all the original indicators in their measurement (.96 and .90 respectively).

Measurement Scale	Items	Initial Cronbach's Alpha (α)	Items	Best Cronbach's Alpha (α)
Intention	I1, I2, I3	.96	I1, I2, I3	.96
Attitude	A1, A2*, A3, A4, A5*	.84	A1, A3, A4	.89
Subjective Norm	SN1, SN2, SN3, SN4	.90	SN1, SN2, SN3	.92
Perceived Behavioral Control	PBC1, PBC2 PBC3	.78	PBC1, PBC3	.84

Note: * reversed-coded indicators

Table 1: Summary of Cronbach's Alpha for Measurement Scales

Content validity was addressed by asking professors and graduate students from a Midwest university in the US about whether the content of the scales appeared to be adequate. In addition, some professors who teach e-commerce related-classes were also asked to provide feedback on face validity. They reviewed the survey and gave feedback on the appropriateness and adequacy of the terminology and content of the measurement scales. They all agreed that the scales seemed to measure what they are supposed to measure. Construct validity was assessed by means of CFA ("contemporary method", Segars and Grover, 1993, p. 518) at the individual construct level described in the next section.

Confirmatory Factor Analysis for Each Individual Construct

The LISREL statistical program was used to conduct confirmatory factor analysis for each construct. In each analysis, the first indicator of each construct was set as the reference value to scale or standardize the latent construct (Diamantopoulos & Siguaw, 2000; Hair et. al, 1998). The covariance matrix generated from PRELIS was used as the input matrix. For each construct CFA, the Phi (PH) matrix of the construct was assigned to a symmetric matrix with all parameters free to be estimated. The Theta Delta (TD) matrix was assigned to a diagonal matrix with all parameters free to be estimated (Byrne,

1998). Finally, the output included residual analysis (RS), standardized (SS) and completely standardized (SC) solutions, t-values (TV), and modification indices (MI).

Three indicators were used to measure the intention construct. The results of CFA are shown in Table 2. Since the hypothesized model had three indicators, the model was saturated (the number of parameters to be estimated is exactly equal to the number of variances and covariances among the observed variables) (Diamantopoulos & Siguaw, 2000; Byrne, 1998) and the fit was perfect ($\chi^2(0) = 0.00$, $p < 1.00$). Each t-value was significant at a level of 0.05. The values for the completely standardized loadings, which determine the relative importance of the observed variables as indicators of the intention construct, revealed high loadings ranging from .90 to .98. Composite reliability indicator and variance extracted for the construct of Intention were manually calculated using Hair et. al's (1998, p. 624) procedure. Composite reliability of this construct resulted in .96 which exceeded .70, the threshold value recommended by Hair et al. (1998). Variance extracted, which represents the overall amount of variance in the indicators accounted for by the latent construct, was calculated as .88. This value exceeded the cut-off value of .50 recommended by Hair et al. (1998). The squared multiple correlation was used to estimate the indicator reliability that explains the extent to which an item adequately measures its associated underlying construct (Bollen, 1989). The squared multiple correlations were deemed to be excellent, ranging from .81 to .96. Table 2 shows completely standardized loadings, reliability and variance extracted for each indicator. Bold numbers indicate construct reliability and variance extracted at the construct level.

Construct & Indicators	Completely Standardized Loadings	Construct & Indicator Reliability	Variance Extracted
<u>Intention</u>		.96*	.88*
I1. My firm strongly intends to incorporate e-commerce within the next year	.90	.81	.19
I2. We have certain plans to incorporate e-commerce in our organization within the next year	.98	.96	.04
I3. Our firm has a strong commitment to incorporating e-commerce within the next year	.94	.88	.12
<u>Goodness-of-Fit Statistics</u>			
The model is saturated and the fit is perfect (no goodness of fit indices reported in the LISREL output)			

* construct reliability and variance extracted at the construct level respectively

Table 2: Results of CFA for Intention

Five indicators were used to measure the attitude construct. The results of the initial estimation of the CFA of the attitude construct were not acceptable. The χ^2 value was significant 61.78(5) ($p < 0.001$) and the Root Mean Square Error of Approximation (RMSEA) was .23. Even though the Goodness-of-Fit Index (GFI) was indicative of a good fit (.90), other fit indices suggested a poor model fit. For example, AGFI was .70 and NFI was 0.89, both of which should be greater than .90 to indicate good fit. Analysis of the modification index suggested correlating the error variance of items A2 and A5 would improve model fit. However, the specification of correlated errors for the purpose of improving model fit should be done based on theoretical or empirical justifications (Byrne, 1998). Then, t-values, error variance, and R^2 values were also analyzed. Even though indicators A2 and A5 had a significant t-value (7.77, $p < 0.07$ and 7.34, $p < 0.08$ respectively), the error variances were high (1.51 and 1.71 correspondingly), and the R^2 values were low (.26 and .24 respectively). In addition, these two same items (A2 and A5) were found to decrease the reliability of the construct (as shown in Table 1). This may also be an indication that A2 and A5 form an independent different construct. Consequently, indicators A2 and A5 were dropped from further analysis.

After recreating the covariance matrix for the CFA, the re-specified model was estimated for the attitude construct with the 3 indicators (A1, A3, and A4). The completely standardized loadings for the attitude construct are shown in Table 3. As three indicators lead to a saturated solution, the re-specified model showed a perfect fit ($\chi^2(0) = 0.00$, $p < 1.00$). The t-values were significant at a level of 0.05. The completely standardized loading values were .87, .91, and .73 respectively. The R^2 values were acceptable (.76, .83, and .53). Composite reliability of this construct resulted in a value of .88 and the variance extracted in a value of .71. Both values exceeded the threshold suggested by Hair et al. (1998).

Construct & Indicators	Completely Standardized Loadings	Construct & Indicator Reliability	Variance Extracted
<u>Attitude</u>		.88*	.71*
A1. Incorporating e-commerce in my firm within the next year would be good	.87	.76	.24
A3. Incorporating e-commerce in my firm within the next year would be positive	.91	.83	.17
A4. Incorporating e-commerce in my firm within the next year would be effective	.73	.53	.47
<u>Goodness-of-Fit Statistics</u>			
The model is saturated and the fit is perfect (no goodness of fit indices reported in the LISREL output)			

* construct reliability and variance extracted at the construct level respectively

Table 3. Results of CFA for Attitude

A total of four observed indicators were used to measure the subjective norm construct (see Table 4). Overall, the model produced satisfactory results with $\chi^2(2) = 2.79$, ($p > .2$) and RMSEA = 0.04. Other model fit indices also indicated quite strong values for a well-fitting model. Table 4 shows a variety of fit indices all suggesting a good model fit. Further, the completely standardized loadings for the four observable indicators ranged from 0.67 to 0.94 and the squared multiple correlation (R^2) ranged from .45 to .88. Construct reliability and variance extracted for subjective norm yielded values of .90 and .70 respectively.

Construct & Indicators	Completely Standardized Loadings	Construct & Indicator Reliability	Variance Extracted
<u>Subjective Norm</u>		.90*	.70*
SN1. Most people who are important to my firm think my firm should incorporate e-commerce within the next year	.94	.88	.12
SN2. Most people who influence the behavior of my firm think my firm should incorporate e-commerce within the next year	.86	.73	.27
SN3. People whose opinions our firm value would prefer our firm to incorporate e-commerce within the next year	.87	.75	.25
SN4. Most firms that are important to my firm have adopted e-commerce	.67	.45	.55
<u>Goodness-of-Fit Statistics</u>			
<u>Absolute Fit Indices</u>		<u>Incremental Fit Indices</u>	
Chi-square (χ^2) of estimate model	2.79 ($df=2$; $p=0.25$)	Adjusted goodness-of-fit index (AGFI)	.97
Goodness-of-fit index (GFI)	0.99	Comparative fit index (CFI)	1.00
Root mean square residual (RMSR)	0.038	Non-normed fit index (NNFI)	1.00
Root mean square error of approximation (RMSEA)	0.041	Normed fit index (NFI)	1.00
		<u>Parsimonious fit indices</u>	
		Parsimony goodness-of-fit index (PGFI)	.20
		Normed χ^2 (χ^2/df)	1.39
		Parsimony normed fit index (PNFI)	.33

* construct reliability and variance extracted at the construct level respectively

Table 4. Results of CFA for Subjective Norm

Three indicators were utilized to measure the perceived behavioral control construct. Results indicated that the model was saturated and the fit was perfect ($\chi^2(0) = 0.00$, $p < 1.00$). The t-values associated with each indicator loading were significant at a level of .001 and the values of the completely standardized loadings ranged from .55 to .87. The squared multiple correlations ranged from .30 to .76. Construct reliability value was .70 and variance extracted was .56, which slightly exceeded the recommended value of .50. Table 5 shows the results of the CFA for perceived behavioral control.

Construct & Indicators	Completely Standardized Loadings	Construct & Indicator Reliability	Variance Extracted
<u>Perceived Behavioral Control</u>			
PBC1. Incorporating e-commerce in my firm within the next year would be easy	.87	.76	.24
PBC2. Incorporating e-commerce in my firm within the next year would be under my firm's control	.55	.30	.70
PBC3. Incorporating e-commerce within the next year would be simple to arrange	.81	.66	.34
<u>Goodness-of-Fit Statistics</u>			
The model is saturated and the fit is perfect (no goodness of fit indices reported in the LISREL output)			

* construct reliability and variance extracted at the construct level respectively

Table 5. Results of CFA for Perceived Behavioral Control

Structural Equation Modeling (SEM) Testing of the TPB Model

SEM is designed to evaluate how well a proposed conceptual model, that contains observed and unobserved (theoretical) indicators, explains or fits the collected data. It also provides the ability to measure or specify the structural or causal relationships among sets of unobserved variables while also describing the amount of unexplained variance (Byrne, 1998) in the measures. An initial theoretical structural model for the TPB, based on the previous CFA for each construct, was examined with three exogenous constructs and one endogenous construct (Figure 2). A total of 13 observed indicators were considered in the model. Path coefficients from the exogenous constructs (ξ) to the endogenous construct (η) are represented with gamma coefficients (γ), which correspond to regression coefficients among the constructs. Figure 2 also shows path coefficients between each construct and its respective indicators (λ) and the error terms associated with each indicator (δ).

The covariance matrix generated from PRELIS was used as the input matrix to the LISREL program. The Phi (PH) matrix was assigned to a symmetric matrix with all parameters free to be estimated. Theta Delta (TD) and Theta Epsilon (TE) matrices were assigned to a diagonal matrix with all parameters free to be estimated. Exogenous variables were allowed to be correlated, which is standard practice in SEM (Byrne, 1998). Gamma (GA) matrix was assigned to a full matrix with all parameters fixed to zero. Later, gamma components (1,1), (1,2), and (1,3) were set free to be estimated. Lambda-X (LX) and Lambda-Y (LY) matrices were set as full matrices with all parameters fixed to zero. The first indicator of each latent variable was used to set the unit of measurement.

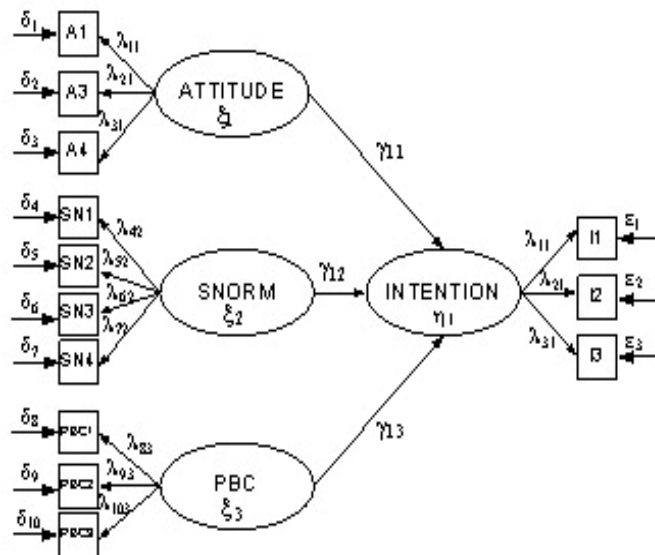


Figure 2: Initial Theoretical Structural Model (SEM Notation)

Fitting this model to the covariance matrix revealed that it was not acceptable as a well fitting model. For example, the chi-square value was significant $\chi^2(59)=198.81$ $p<0.001$, RMSEA= 0.11, GFI=0.87, AGFI=0.79, and $\chi^2/df= 3.37$, which represented evidence of a misfit in the model. A closer look at the components of the model showed large positive and negative standardized residuals (more than five percent of the residuals exceeded the 2.58 threshold). In addition, the maximum modification index (50.61) suggested creating a link between indicator A3 and the subjective norm construct. Furthermore, an inspection of the error variance matrix showed that indicator PBC2 had the highest error variance value of 1.96. This same indicator had the lowest R² value of .32 which is very close to the minimum acceptable value (.30). Therefore, indicator PBC2 was dropped from the analysis and the model was re-specified.

After recreating the covariance matrix with 12 indicators by using PRELIS, the LISREL syntax was adjusted and the model was re-estimated. The results showed a slight decrease in χ^2 (196 with 48 degrees of freedom). The RMSEA, however, resulted in a higher value (0.12) when compared with the RMSEA of the previous model with 13 indicators. Other goodness of-fit indices resulted in lower values (GFI=0.86, and AGFI=0.78, $\chi^2/df= 4.09$). An inspection of modification indices suggested that the model would achieve a better fit by including a path between indicator A4 and subjective norm. A closer look at indicator A4 showed that it had a high error variance of 1.07 which evidenced a contribution to the misfit of the model. Therefore, indicator A4 was dropped from the analysis.

Finally, the model was re-specified by constructing the covariance matrix with 11 indicators. The final results suggested a model with a better fit to the data. The chi-square value dropped considerably to 106.91 with 38 degrees of freedom ($p<0.001$). Although this value was still significant, the ratio χ^2/df was 2.81, which is within the acceptable range of good fit. Additionally, all of the goodness-of-fit statistics supported that the revised model was a well-fitting model to the data and suggested that this model could be a final structural model (RMSEA=0.094, GFI=0.91, AGFI=0.85, RMR=0.03, CFI=0.99, NNFI=0.98, PGFI=0.53, NFI=0.98, and PNFI=0.68). The final revised model along with the standardized paths is shown in Figure 3.

LISREL output indicated that 81% of the variance in intention could be jointly explained by attitude, subjective norm, and perceived behavioral control measures in the revised structural model. The results of SEM analysis indicated that the path from the attitude construct to the intention construct was significant (t-value=2.57, $p<0.05$, standard error=0.09) as well as the path from the subjective norm construct to the intention construct (t-value=7.23, $p<0.01$, standard error=0.10). However, the results indicated that the path from the perceived behavioral control construct (PBC) to the intention construct was not significant (t-value=0.26). Our results demonstrate that as attitude toward e-commerce adoption increase and as subjective norms toward adoption increase, the intention to adopt e-commerce for the firm also increase in the Chilean sample.

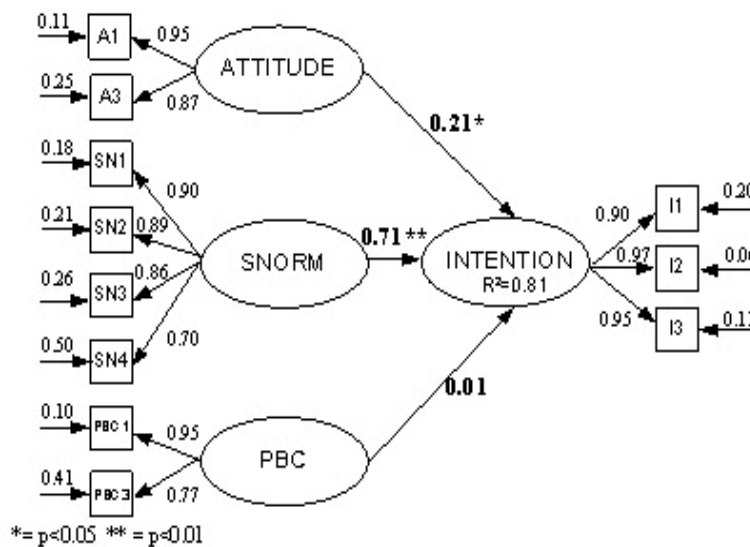


Figure 3: Revised Model

DISCUSSION AND CONCLUSIONS

The results enhance our understanding of the nature of the TPB instrument and shed some light on its applicability in international contexts. The attitude construct, usually measured by four or five items in US studies (Harrison et al., 1997; Riemenschneider et al., 2003), resulted in a measurement model with a poor fit to the data for the Chilean sample. Therefore, the measurement model for attitude was reduced to two items that collectively explained the construct. These results from Chile are consistent with previous research that has established a positive relationship between attitude and the intention to adopt information technology among US respondents. For example, Riemenschneider et al. (2003) found that attitude was a significant predictor of the intention to adopt a web site among top managers of SMEs in the US. They tested the relationship between these two constructs in different models (TAM, TPB, appended, and hybrid models) and found significant relationships in all of them. Similarly, Venkatesh et al. (2003) found that attitude was a significant predictor of the intention to adopt IT in the workplace in voluntary and mandatory settings. Harrison et al. (1997) found that attitude was a significant predictor of the intention to adopt new IT among small business executives in the US.

The subjective norm construct, measured by four items, showed to be a well-fitting measurement model and was the most significant predictor in the structural model of intention to adopt e-commerce. Prior studies conducted in the US showed that subjective norm had a weak role in predicting online behaviors (George, 2002). In this study, however a strong relationship between subjective norm and intention was found. It seemed that Chilean managers did perceive social pressure from people and other firms to adopt e-commerce in their companies, which, in turn, influenced their intention to adopt e-commerce in the future. This finding makes complete sense in the setting of this study. Chile is characterized as being a collectivistic culture (Hofstede, 1997). As such, Chileans emphasize the co-dependency between individuals and their groups, where the groups extend beyond the immediate family. Therefore, Chilean managers may be influenced by social referent groups (persons whose opinions the firm values, other firms, etc.) when making the decision to adopt or not to adopt e-commerce in the future.

The results also enhance our understanding of the PBC model as applied to an international context. The results from the CFA confirmed a three-item structure for this construct. However, when taken together with the rest of the TPB model, the structure of PBC was reduced to two items and its path to intention was non-significant. This finding, however, was not too surprising, given the mixed results from previous studies regarding the relationship between PBC and intention. While Chang (1998) found that PBC was the strongest predictor of intention, Venkatesh et al. (2003) found that PBC was a significant predictor of intention only in some of the relationships, and Riemenschneider et al. (2003) found that PBC was not a significant predictor of intention in any of their hypothesized models. For the Chilean sample, it seems that PBC does not have an impact on the intention to perform the behavior. A possible explanation for the non-significant relationship found between PBC and the intention to adopt e-commerce among managers/owners of SMEs in Chile has its roots on cultural differences among the countries in which previous studies have taken place. More specifically, the uncertainty avoidance dimension of Hofstede (1997) may play a role in explaining this result. Americans exhibit a low uncertainty avoidance index, which means that they are more prone to risk taking and to assume changes. Chileans, on the other hand, exhibit a culture that is less prone to risk taking and may avoid changes. The incorporation of e-commerce brings structural changes and redesign of organizations. Determining the required resources (financial, technological, human, etc.) associated with the implementation of e-commerce may be a difficult task. While American managers of SMEs may not be influenced by the fact of having incomplete information to make the decision to adopt e-commerce, Chilean managers may feel overwhelmed with the uncertainty of not knowing the necessary resources to implement e-commerce, and therefore, may not be able to determine the importance of having these resources available. This fact may explain, to a certain extent, why PBC was not found to be a significant predictor of the intention to adopt e-commerce among Chilean managers of SMEs.

By using a sound theory such as the TPB, this study intended to fill in the research gap concerning the lack of strong theoretical foundations in IT research involving SMEs in other parts of the world. As a matter of fact, one of the major contributions of this study is that it is the first research that has applied the TPB to predict e-commerce adoption among managers/owners of SMEs in Chile. Results showed that using the TPB, the intention to predict the adoption of e-commerce among managers/owners of SMEs in Chile is approximately 80%.

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Appendix A: Items to Measure the TPB Instrument

Item	Attitude (A)
A1	Incorporating e-commerce in my firm within the next year would be good
A2	Incorporating e-commerce in my firm within the next year would be harmful
A3	Incorporating e-commerce in my firm within the next year would be positive
A4	Incorporating e-commerce in my firm within the next year would be effective
A5	Incorporating e-commerce in my firm within the next year would be foolish
Subjective Norm (SN)	
SN1	Most people who are important to my firm think my firm should incorporate e-commerce within the next year
SN2	Most people who influence the behavior of my firm think my firm should incorporate e-commerce within the next year
SN3	People whose opinions our firm value would prefer our firm to incorporate e-commerce within the next year
SN4	Most firms that are important to my firm have adopted e-commerce
Perceived Behavioral Control (PBC)	
PBC1	Incorporating e-commerce in my firm within the next year would be easy
PBC2	Incorporating e-commerce in my firm within the next year would be under my firm's control
PBC3	Incorporating e-commerce within the next year would be simple to arrange
Intention (I)	
I1	My firm strongly intends to incorporate e-commerce within the next year
I2	We have certain plans to incorporate e-commerce in our organization within the next year
I3	Our firm has a strong commitment to incorporating e-commerce within the next year