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THE ROLE OF HABIT IN INFORMATION SYSTEMS CONTINUANCE: EXAMINING THE EVOLVING RELATIONSHIP BETWEEN INTENTION AND USAGE

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Abstract

The purpose of this study is to investigate the evolving relationship between intention and information systems usage over time. Our main argument is that as individuals get into the habit of continuously using a system, the predictive power of intention will be diluted. Consequently, the more usage is performed out of habit, the less cognitive planning is involved. The research model is tested in a longitudinal setting and the results present strong support to the hypotheses. The moderating effect of habit on the relationship between intention and usage increases over time, while the impact of intention on IS continued usage weakens over time. In addition, prior behavior is found to have a strong and significant effect on continued usage. The implications of this study are noteworthy for both researchers and practitioners.

Keywords: IS continuance, habit, intention, usage, longitudinal study

Introduction

Information systems adoption is just the first step toward overall IS success. An IS implementation can truly be considered as a "success" when a significant number of users have moved beyond initial adoption and used the information systems on a continued basis (Bhattacherjee 2001; Davis and Venkatesh 2004; Limayem and Hirt 2003). Bhattacherjee (2001) was one of the very first researchers to propose an IS continuance model in line with the expectation confirmation theory. His IS continuance model seeks to explain an IS user's intention to continue using the system. Bhattacherjee's investigation stopped at intention, without assessing IS continuance, and his model assumed that IS continued usage is primarily determined by intention. Although this assumption has been validated in past research on IS adoption, it may not explain continuance of usage equally well in the case of post-adoption. As Ouellette and Wood (1998) urged, frequently performed behaviors tend to become habitual and thus automatic over time. A person's baseline response to many situations related to continued IS usage may not be predominantly determined by intentional behavior, but rather be the result of habitual behavior. Thus, there is a need to understand the role of habit and its impact on the relationship between intention and usage over time.

As a step toward bridging the gap, the purpose of this study is to examine the role of habit and the evolving relationship between intention and usage. This paper is structured as follows. We first provide the theoretical background of this study by reviewing the literature on intention-based models, the IS continuance model, and habit. Building on this review, we introduce our research model. We then describe the research method and discuss the statistical results. We conclude the paper by providing several managerial and research implications of this study. Finally, directions for future research are suggested.

Theoretical Background

In this section, we first provide an overview of intention-based models and the IS continuance model. Then, we discuss the role of habit and its impact on the relationship between intention and usage over time.

Intention-Based Models

In the past two decades of IS usage research, there has been a predominant focus on cognitive behavioral models, including the theory of reasoned action (TRA), the theory of planned behavior (TPB), the technology acceptance model (TAM) and its variants. IS researchers have adapted intention-based models from social psychology as a theoretical foundation for research on the determinants of user behavior.

Theory of Reasoned Action

TRA (Fishbein and Ajzen 1975) assumes that one's intentions capture the motivational factors that influence one's behavior. Intention, in turn, is formed by two factors: (1) one's attitude which reflects feelings of favorableness or unfavorableness toward performing a behavior, and (2) the subjective norm, which reflects the significant influence of other referents' desire for the individual to perform or not to perform a behavior. An individual's attitude is further described as the summation of the strength of each salient belief multiplied with the subjective evaluation of the belief's attribute. Subjective norm, similarly, is considered as the summation of the strength of each normative belief multiplied with the person's motivation to comply with the referent in question.

Theory of Planned Behavior

Applying this model to the study of IS adoption, IS usage behavior is predominantly explained by behavioral intention. Intention, in turn, is formed by attitudinal beliefs and social normative influences. Subsequent research has placed considerable effort on extending the TRA model to explain other contextual and research concerns. With the various modifications and extensions of additional variables, the concept of perceived behavioral control, as proposed by Fishbein and Ajzen, was widely recognized and led to the development of the theory of planned behavior (TPB). According to Ajzen (1991), the more resources and opportunities individuals think they possess, the greater will be their perceived control over their behavior and, therefore, the greater the likelihood for these individuals to behave accordingly.

Technology Acceptance Model

Research in this area has explored very thoroughly the many antecedents and moderating effects leading to the initial acceptance of a particular IS. Among the intention-based models, TAM is considered as the most parsimonious and powerful theory for describing user acceptance of information systems (Lee et al. 2003; Venkatesh and Davis 2000). Detailed discussions on TAM in IS research can be found in Lee et al. (2003) and Legris et al. (2003). According to the TAM, IS usage behavior is predominantly explained by behavioral intention. Behavioral intention, in turn, is determined by attitude toward usage, as well as the direct and indirect effects of perceived usefulness and perceived ease of use. Both perceived usefulness and perceived ease of use jointly affect attitude, while perceived ease of use has a direct impact on perceived usefulness.

The IS Continuance Model

In recent years, researchers have started to advocate the need to understand the continued IS usage behavior (Bhattacherjee 2001; Davis and Venkatesh 2004; Limayem and Hirt 2003). IS continuance describes behavior patterns reflecting continued use of a particular IS. Continuance refers to a form of post-adoption behavior. Although the term *post-adoption* actually refers to a suite of behaviors that follow initial acceptance (Rogers 1995), including continuance, routinization, infusion, adaptation, and assimilation, in the literature it is often used as a synonym for continuance (see Karahanna et al. 1999). In this study, we limit ourselves to the terms IS continuance or continued IS usage behavior. Bhattacherjee's post-acceptance model of IS continuance seeks to explain an IS user's intention to continue using an IS. Based on expectation-confirmation theory, IS continuance

intention is predominantly determined by satisfaction and perceived usefulness. In the marketing literature, satisfaction is considered key to building and retaining a loyal base of long-term consumers. A similar argument can be made in the context of IS continuance where satisfaction with an IS tends to reinforce a user's intention to continue using the system. By including perceived usefulness, Bhattacherjee's model reflects current thinking in the area of IS, which holds that perceived usefulness is the only construct consistently influencing user intention across both adoption and post-adoption phases. The model also relates satisfaction and perceived usefulness to the degree with which the user's expectations about the IS are confirmed. Expectation provides the baseline level against which confirmation is assessed by users to determine their evaluative response or satisfaction. The better they are met, the more useful it appears to users and the more satisfied they are.

Habit

Habit has been a core research topic of numerous studies from diverse theoretical perspectives. Across disciplines, habits are commonly understood as "learned sequences of acts that become automatic responses to specific situations which may be functional in obtaining certain goals or end states" (Verplanken et al. 1997, p. 540). Although Ajzen (2002) has suggested that intention is the main causal mechanism behind the enactment of behavior (habitual or otherwise), the literature on habit maintains that the spontaniety of behavior lessens the need to access intention (see Aarts et al. 1997). Recently, Verplanken et al. (1998) have noted that "when a behavior is repeatedly and satisfactorily executed and becomes habitual…it may lose its reasoned character" (p. 113). Such an interaction was also demonstrated in Triandis' (1980) model of attitude–behavior relationships, where intentions are assumed to predict behavior to the extent that the habit component is weak, or to a lesser degree, when habit is strong. In this study, we used Limayem et al.'s (2003) definition of IS habit as "the extent to which using a particular IS has become automatic in response to certain situations."

Research Model

Figure 1 depicts the research model for explaining the role of habit and its impact on the relationship between intentions and IS usage over time.

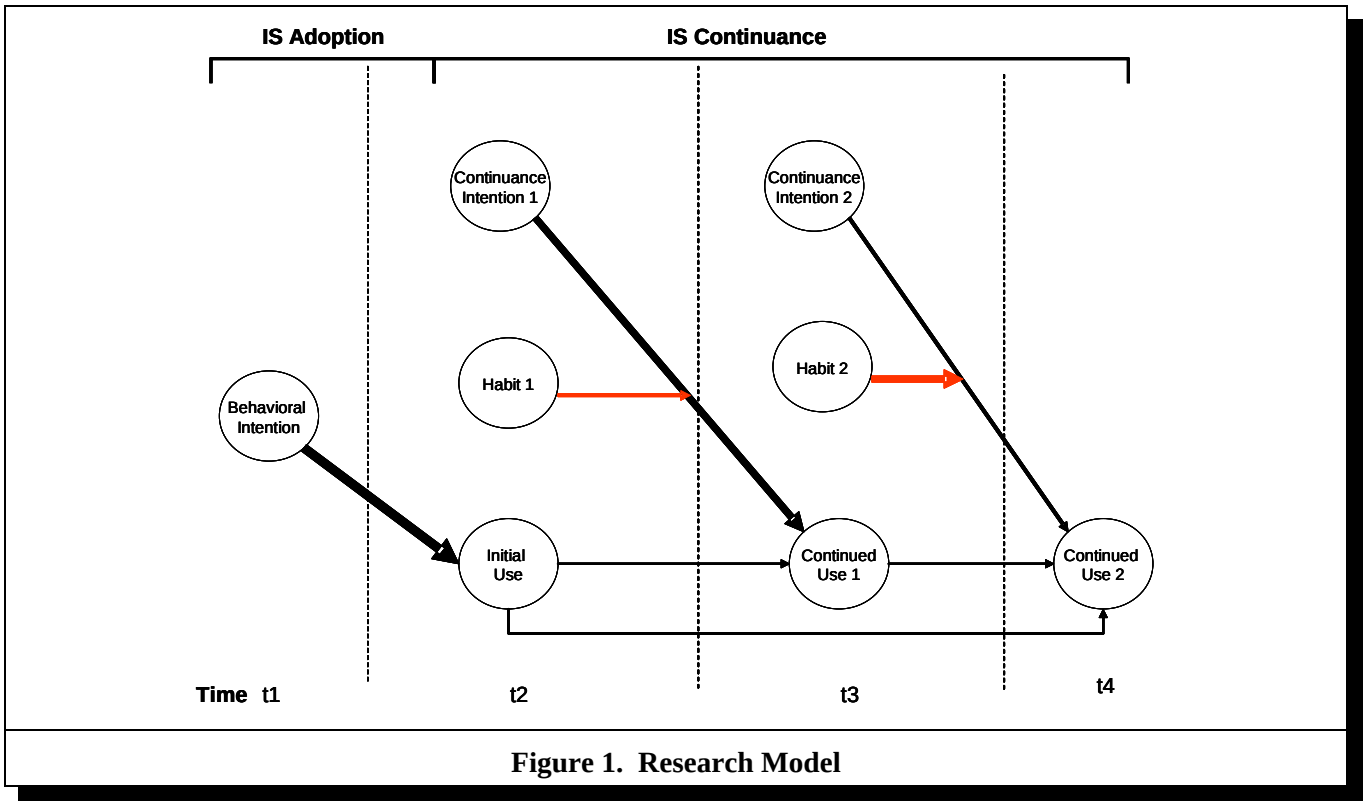

Figure 1. Research Model

The Impact of Habit on the Relationship between Intention and IS Usage

Our argument is that if a person is in the habit of continuously using an IS, there would be less conscious planning (see Ouellette and Wood 1998; Saba et al. 1998; Trafimow 2000; Tyre and Orlikowski 1994) assumed by any of the intentional behavior models discussed in the previous section. Supporting this line of reasoning, Aarts et al. (1998, p. 1364) found that habit strength attenuates the amount of information acquired and utilized before the decision is made. We therefore argue that if individuals are in the habit of using a particular system, the predictive power of intentions on IS usage is attenuated. Indeed, Verplanken et al. (1998) obtained a stronger intention–behavior relation for people who were not in the habit of performing the behavior than for people who were in the habit of performing the behavior. Put differently, habit and intention significantly interact in the prediction of continuous IS usage. Given the range of arguments as presented above, we adopt the moderation perspective for the research reported in this paper.

As depicted in Figure 1, at the IS adoption stage, IS initial use is primarily determined by behavioral intention. At the IS continuance stage, as the use of a particular IS becomes habitual, the less cognitive planning it involves. Habit in the behavioral domain increased in strength, and intentions became less predictive of IS continuance. Thus, we have the following two hypotheses:

H1: The moderating role of habit increases over time.

H2: The relationship between intention and usage weakens over time.

The Role of Prior Behavior

Prior behavior has been one of the core research topics of many studies in the psychology and marketing domain (e.g., Bagozzi 1981; Bagozzi and Warshaw 1990;Bentler and Speckart 1979; Fredricks and Dossett 1983; Norman and Smith 1995). Ajzen (1991) argued that prior behavior could be used to test the sufficiency of any model designed to predict future behavior under the assumption of stable determinants. Bentler and Speckart (1979) proposed that a model that includes a direct path from prior behavior to later behavior provided a significantly better fit to the data than the theory of reasoned action. In marketing, Bolton and Lemon (1999) suggested that a customer's recent usage experience could be used to predict future usage. In the IS usage context, Davis and Venkatesh (2004) found that users' direct hands-on experience is the key driver of their sustained usage. They empirically showed that when they included the construct "prior usage behavior" as an additional antecedent of IS continuance behavior, all other determinants in the TAM become insignificant. Along with other researchers, we agree with Davis and Venkatesh's assertion that prior behavior is the most important antecedent in predicting future behavior (Bagozzi and Kimmel 1995; Conner and Armitage 1998; Norman and Smith 1995). Therefore, we hypothesize that initial usage has significant impact on IS continued usage.

H3: Initial usage has significant impact on IS continued usage.

Research Method

Our focus is on the role of habit and the changing nature of the relationship between intention and IS usage over time. The system used in this study is the Blackboard Learning System (**www.blackboard.com**). It is a Web-based server software platform that offers industry-leading course management, an open architecture for customization and interoperability, and a scalable design that allows for integration with student information systems and authentication protocols. Blackboard is adopted as a teaching platform for several courses provided by a local university. Students can log-in to the system to download lecture notes, share documents with their project teammates, and communicate with their fellow students and course instructors. First year students are chosen as our research subjects, since they have no prior knowledge of the system, making it relevant to study adoption as well as continuance. The usage of this system is entirely voluntary and students can use other means to download and upload materials and to communicate with their instructor and classmates. In other words, students are not penalized for not using this system. The sections below describe a detailed plan for data collection procedure, measurement, and data analysis.

Data Collection Procedure

The sample is a group of 495 Year 1 students with no initial experience using Blackboard. Participation in this study is voluntary. In order to encourage participation, an incentive is given to each of the participants in the form of bookstore cash coupons.

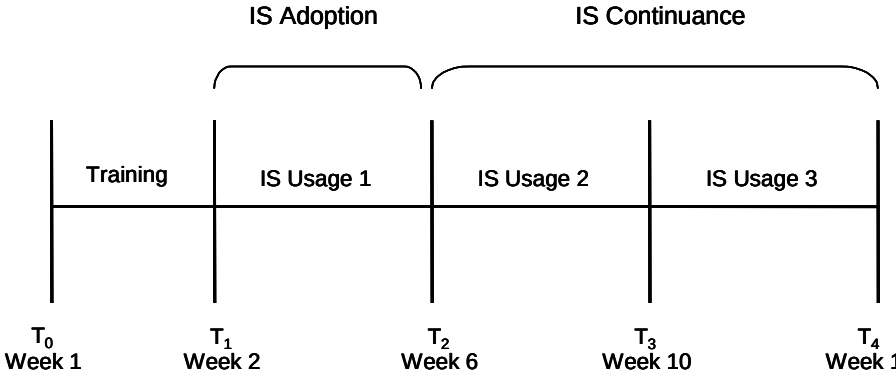

Figure 2. Data Collection Procedure

Recruitment was carried out in the first week of the semester. All participants received a 2-hour training session in Week 2 on the basic functions of Blackboard. The data collection involves four rounds: immediately after the initial training (t_1) and every four weeks after the initial training (t_2, t_3, and t_4) (see Figure 2). Participants are invited to answer an online survey assessing their intention, habit, and usage.

Measures

Table 1 lists the measures used in this research. We use items that have been validated by prior research, but modify the wording of the questionnaire in order to fit this particular context of Blackboard usage. Behavioral intention is measured using Davis (1989) and Taylor and Todd (1995). IS continuance intention is adapted from Bhattacherjee (2001). Habit is assessed using the measures from Limayem et al. (2003). The measures fir these constructs use a seven-point Likert scale, from strongly disagree to strongly agree. The formative items measuring initial usage and IS continuance are taken from Davis (1989) and Steinfield (1985). Two 7-point semantic differential items were presented, anchored by "never/ always" and "once a month/once a day." The use of different scale endpoints and formats for the dependent variable (initial use–continued use) and the independent variables (habit and intention) can help diminish method biases (Podsakoff et al. 2003).

Data Analysis

The analysis of the data is done in a holistic manner using partial least squares (PLS). The PLS procedure (Wold 1989) has been gaining interest and use among researchers in recent years because of its ability to model latent constructs under conditions of non-normality and small to medium sample sizes (Chin 1998; Chin and Gopal 1995; Compeau and Higgins 1995). It allows one to specify both the relationships among the conceptual factors of interest and the measures underlying each construct, resulting in a simultaneous analysis of (1) how well the measures relate to each construct and (2) whether the hypothesized relationships at the theoretical level are empirically true. This ability to include multiple measures for each construct also provides more accurate estimates of the paths among constructs, which are typically biased downward by measurement error when using techniques such as multiple regressions. Furthermore, due to the formative nature of some of the measures used and non-normality of the data, LISREL analysis was not appropriate (Chin and Gopal 1995). Thus, we choose PLS Graph Version 3.00 (Chin 1994) to perform the analysis.

Results

Following the two-step analytical procedure (Hair et al. 1998), we first examined the measurement model, then the structural model. The rationale of this two-step approach was to ensure that our conclusion on structural relationships is drawn from a set of measurement instruments with desirable psychometric properties.

Table 1. List of Meaures

Constructs	Measures	Sources
Behavioral Intention		
BI1 BI2 BI3 BI4	I will use Blackboard during the next 4 weeks. I intend to use Blackboard during the next 4 weeks. I intend to use Blackboard frequently during the next 4 weeks. All things considered, I expect to use Blackboard during the next 4 weeks.	Taylor and Todd 1995
Continuance Intention		
CI1_1/CI2_1 CI1_2/CI2_2 CI1_3/CI2_3	If I could, I would like to continue my use of Blackboard. All things considered, I expect to continue using Blackboard during the next 4 weeks All things considered, It is likely that I will continue to use Blackboard during the next 4 weeks.	Bhattacherjee 2001
Habit		
HABIT1_1/HABIT2_1 HABIT1_2/HABIT2_2 HABIT1_3/HABIT2_3 HABIT1_4/HABIT2_4 HABIT1_5/HABIT2_5 HABIT1_6/HABIT2_6	I use Blackboard as a matter of habit. Using blackboard has become automatic to me. Using blackboard is natural to me. When faced with a particular task, using Blackboard is an obvious choice for me. Using blackboard has become a habit to me. It is a habit of mine to use Blackboard.	Limayem et al 2003
Initial Use/Continuance Use		
 IU1/CU1 IU2/CU2	How often did you use Blackboard during the last 4 weeks? Never/Always Once a month/Once a day	Steinfield 1985 Davis 1989

Table 2. Psychometric Properties of Reflective Measures

Construct	Item	Loading
Behavioral Intention CR=0.95, AVE= 0.82	BI1 BI2 BI3 BI4	0.88 0.94 0.91 0.91
Continuance Intention 1 CR=0.92, AVE= 0.78	CI1_1 CI1_2 CI1_3	0.84 0.91 0.91
Habit 1 CR=0.93, AVE= 0.68	Habit1_1 Habit1_2 Habit1_3 Habit1_4 Habit1_5 Habit1_6	0.86 0.84 0.79 0.67 0.88 0.87
Continuance Intention 2 CR=0.96, AVE= 0.89	CI2_1 CI2_2 CI2_3	0.92 0.95 0.95
Habit 2 CR=0.95, AVE= 0.77	Habit2_1 Habit2_2 Habit2_3 Habit2_4 Habit2_5 Habit2_6	0.89 0.86 0.85 0.85 0.92 0.91

Notes: CR = Composite Reliability; AVE = Average Variance Extracted

Table 3. t-Statistics of Formative Measures				
Construct	**Item**	**Weight**	**Std. Error**	**t-value**
Initial Use	IU1	0.66	0.11	6.08
	IU2	0.47	0.12	3.86
Continued Use 1	CU1_1	0.66	0.12	5.67
	CU1_2	0.5	0.13	3.80
Continued Use 2	CU2_1	0.59	0.11	5.65
	CU2_2	0.62	0.10	6.45

The Measurement Model

Convergent validity indicates the extent to which the items of a scale that are theoretically related are actually empirically related. Tables 2 and 3 present information concerning the loadings and weights of the measures of our research model. All the reflective measures fulfilled the recommended levels of the composite reliability and average variance extracted. As shown in Table 2, all reported loadings were higher than 0.50, as recommended by Fornell and Larcker (1981). All the values of composite reliability and average variance extracted were considered very satisfactory, with composite reliability at 0.92 or above and average variance extracted at 0.77 or above. All of our formative measures had significant path loadings at the 0.01 level. As shown in Table 3, the formative items in the model with weights from 0.59 to 0.66 demonstrated a substantive contribution to their corresponding construct.

Testing for discriminant validity involves checking whether the items measure the construct in question or other (related) constructs. Discriminant validity was verified with the squared root of the average variance extracted for each construct higher than the correlations between it and all other constructs (Fornell and Larcker 1981). As shown in Table 4, each construct shares greater variance with its own block of measures than with the other constructs representing a different block of measures.

To better clarify the issue of discriminant validity, specifically the relationship between intention and habit, we conducted an additional series of confirmatory factor analyses using Segars and Grover's (1993) approach. To do so, we first ran the model imposing a correlation of 1 between the two constructs. Then, we ran another model with a freely estimated correlation between the two constructs. According to Segars and Grover, discriminant validity is demonstrated if there is a significant difference of the χ^2 statistics (i.e., χ^2 difference is greater than 3.84) between the constrained and unconstrained models. As reported in Tables 5 and 6, the χ^2 difference test in our case is statistically significant, allowing us to confirm the discriminant validity of the item measuring habit and intention.

Overall, these results provide strong empirical support for the reliability and convergent validity of the scales of our research model.

Table 4. Correlation Between Constructs (Diagonal Elements*)					
	BI	**CI1**	**HABIT1**	**C2**	**HABIT2**
Behavioral Intention (B1)	**0.91**				
Continuance Intention 1 (CI1)	0.33	**0.88**			
Habit 1 (HABIT1)	0.30	0.62	**0.82**		
Continuance Intention 2 (CI)	0.27	0.37	0.38	**0.94**	
Habit 2 (HABIT2)	0.24	0.40	0.47	0.63	**0.88**

*Diagonal elements are square roots of the average variance extracted.

Table 5. χ^2 Test for Discriminant Validity (Habit and Continuance Intention at Time 3)		
Habit (HABIT1) vs. Intention (CI1)	**d.f.**	**χ^2**
Fixed	27	592.91
Free	26	245.05
Difference	1	347.86
Distinct Construct?		YES

Table 6. χ^2 Test for Discriminant Validity (Habit and Continuance Intention at Time 4)		
Habit (HABIT2) vs. Intention (CI2)	**d.f.**	**χ^2**
Fixed	27	839.35
Free	26	191.67
Difference	1	647.68
Distinct Construct?		YES

The Structural Model

Figure 3 presents the results of the longitudinal analysis with overall explanatory powers, estimated path coefficients (all significant paths are indicated with an asterisk), and associated t-value of the paths. Tests of significance of all paths were performed using the bootstrap resampling procedure.

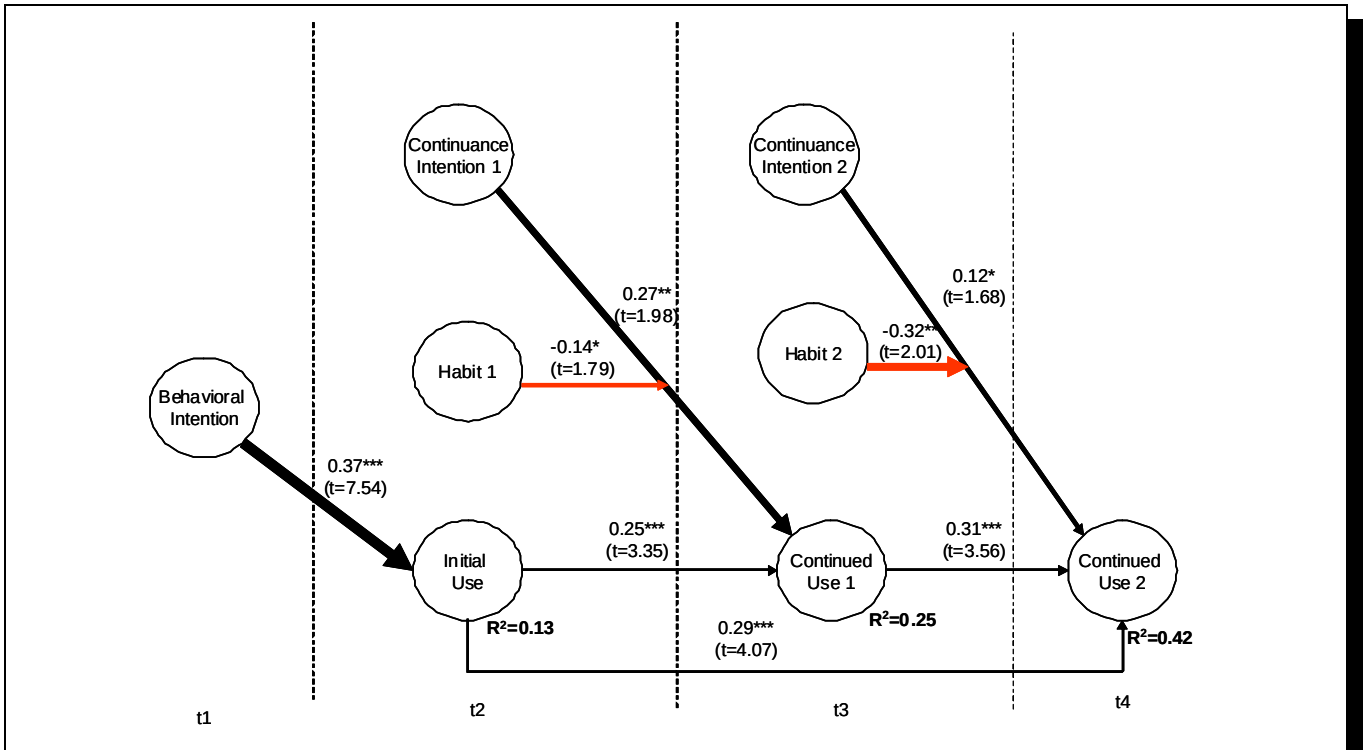

Figure 3. Results of PLS Analysis

As shown in Figure 3, all hypothesized paths in the research model are found statistically significant. At the IS adoption stage, behavioral intention exhibits a strong and significant effect on initial use, with path coefficient of 0.37. At the IS continuance stage, continuance intention is also found to have a significant effect on continued use. However, as shown in Figure 3, the relationship between continuance intention and continued use weakens over time, where the path coefficient drops from 0.27 to 0.12. On the other hand, the moderating effect of habit on the relationship between continuance intention and IS continued usage increases from -0.14 to -0.32. The variance explained (R^2) in the research model also increases, with 13 percent of the variance in initial use, 26 percent of the variance in continued use 1, and 42 percent of the variance in continued use 2. The results provide support for hypothesis 1 and 2.

In addition, the result provides evidence to the argument that prior behavior determines future behavior. As shown in Figure 3, initial use is found to have significant effect on IS continued use at *Time 3 (t_3)*, as well as at *Time 4 (t_4)*, while continued use at *Time 3 (t_3)* has a significant impact on IS continued use at *Time 4 (t_4)*. Hypothesis 3 is also supported in this study.

Discussion and Conclusions

Motivated by the need to better understand the moderating role of habit on the relationship between intention and usage over time, this study used a longitudinal setting to test the research model and hypotheses. The findings present strong support for the three research hypotheses: The moderating effect of habit on the relationship between intention and usage increases over time; the impact of intention on IS continued usage weakens over time; prior behavior exhibits a significant effect on IS continued usage. These results have several implications for theory and practice.

Limitations of this Study

Before moving on to highlight the implications for research and practice, we would like to address the limitations of this study. First, the data was collected in the context of an Internet-based learning system. The replication of this study in organizational contexts is necessary before the results can be generalized to other types of systems and settings. Second, prior research empirically demonstrated the difference between self-reported measures of IS usage versus computer-recorded measures (Straub et al. 1995). Some researchers even argue that self-reported measures are not accurate enough to reflect actual usage of the system (Trice and Treacy 1986). Therefore, future research should attempt to use computer-recorded measures to capture IS usage. Finally, the explained variance of IS continuance of this study was only 42 percent. This suggests that further refinement of this model, by including other important variables that affect IS continuance, is warranted.

Implications for Theory and Research

To the best of our knowledge, this study is one among very few that has attempted to investigate the evolving role of habit on the relationship between intention and IS usage over time. Building upon previous studies on IS adoption and IS continuance, this study further introduces the concept of habit in the research model, with a particular focus on its moderating effect on the relationship between intention and usage. Specifically, we supported the line of argument (Aarts et al. 1998; Verplanken et al. 1998) that habit strength attenuates the amount of information required and utilized before the decision is made. In other words, the stronger the effect of habit, the weaker the effect of intentions on continued usage.

Our findings confirmed the theoretical argument that the strength of intention to predict continuance is weakened by a high level of IS habit. This may explain why prior studies did not find a significant relationship between intention and behavior (e.g., Dishaw and Strong 1999). In addition, our findings imply that intentions can no longer be regarded as the only predictor of actual behavior. In our case, initial IS usage (or prior behavior) also exhibits a strong and significant impact on IS continuance. Researchers studying technology acceptance in general, and/or IS continuance in particular, therefore, should not stop at intentions, but should include measurements for actual behavior and other important determinants (like habit and initial usage) in the study of IS continuance. Another key contribution of this study is that it provides important insights into the dynamic nature of the relationship between IS adoption and IS continuance. Precisely, our findings imply that the relationship of habit, intention, and usage changes over time; therefore, researchers are encouraged to use a longitudinal approach to capture the changes in the IS usage over time. Finally, we hope that this theoretical development constitutes a first step toward a better understanding of the evolving relationship between intention and usage over time.

Implications for Practice

While this study leads to several interesting implications for theory and research, it is also relevant for practitioners. Our results showed that when behavior becomes habitual, users tend to use the system automatically without going through the cognitive planning process. In addition, their initial usage becomes an important factor determining the level of IS continuance. This suggests that once the users adopt the system, they have a higher tendency to continue using it. Managers should realize that initial usage, to a very large extent, determines IS continuance. Thus, they should carefully design an implementation plan that encourages usage in the adoption stage, and avoid any "bad start" in terms of initial usage where it could significantly hinder continuous use of that system.

Future Research

Examining the moderating role of habit on the relationship between intention and usage is a first step toward better understanding IS usage over time. Future research should continue to explore the dynamic nature of IS usage in order to increase the variance explained in the model. In this study, we only focus on the impact of habit, as well as prior behavior, on IS continuance. Another fruitful avenue of research may consist of adding other factors affecting IS continuance. For instance, it would be interesting to incorporate satisfaction in the research model and examine IS usage across different adoption stages using cognitive, habitual, and affective perspectives. Finally, this study is conducted at the individual level. Future research might extend the current study by investigating IS adoption and post-adoption at the organizational level. Advances in business-to-business electronic commerce, we believe, would make an interesting examination of IS adoption and post-adoption in an interorganizational system such as electronic markets.

In conclusion, considering the many interesting questions that this study has raised, we hope that it promotes additional theorizing and empirical investigation aimed at better understanding IS usage behavior over time.

Acknowledgments

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