

8-2010

Integrating Trust in technology and Computer Self-Efficacy within the Post-Adoption Context: An Empirical Examination

Kevin Craig

Clemson University, kevin@kevincraig.net

Stefan Tams

Clemson University, stefan.tams@hec.ca

Paul Clay

Washington State University, pclay@wsu.edu

Jason Thatcher

Clemson University, jthatch@clemson.edu

Follow this and additional works at: <http://aisel.aisnet.org/amcis2010>

Recommended Citation

Craig, Kevin; Tams, Stefan; Clay, Paul; and Thatcher, Jason, "Integrating Trust in technology and Computer Self-Efficacy within the Post-Adoption Context: An Empirical Examination" (2010). *AMCIS 2010 Proceedings*. 425.

<http://aisel.aisnet.org/amcis2010/425>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2010 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Integrating Trust in technology and Computer Self-Efficacy within the Post-Adoption Context: An Empirical Examination

Kevin Craig

Clemson University
kevin@kevincraig.net

Jason Thatcher

Clemson University
jthatch71@gmail.com

Stefan Tams

Clemson University
stams@clemson.edu

Paul Clay

Washington State University
pclay@wsu.edu

ABSTRACT

This work in progress examines the roles that Trust in Technology (TRIT) and Computer Self-efficacy (CSE) play in predicting post-adoptive usage behavior. Under the umbrella of social cognitive theory, it uses attribution theory and the trust literature to develop an integrative model of trust and self-efficacy. Specifically, we posit that TRIT impacts users' CSE and that these beliefs lead to post-adoptive information technology (IT) usage. To examine our model, we propose a study that brings CSE, TRIT, Deep System Usage, and Trying to Innovate with IT into a single articulated model. Using data from 372 students, we use PLS to examine the hypothesized relationships. We conclude with a discussion of findings.

Keywords

Trust, Computer Self-Efficacy, Deep Use, Trying to Innovate, Social Cognitive Theory, Attribution Theory.

INTRODUCTION

When users engage in deep use of systems, they are thought to gain greater value from their time spent using technology. Accordingly, the innovation diffusion literature has examined mechanisms which encourage beneficial post-adoptive information systems' use (Burton-Jones and Straub, 2006; Jasperson, Carter, and Zmud, 2005). To deepen our understanding of post-adoption use, this paper ties together two distinct literatures: TRIT, which refers to the extent to which people trust specific attributes of an IT (Thatcher et al., 2010) and CSE, which is generally the extent to which individuals' believe in their ability to use a computer in support of work tasks (Compeau and Higgins, 1995). Specifically, this paper examines TRIT and CSE's relationship with two post-adoptive behaviors: deep use and trying to innovate with IT. While trust has been extensively examined as a predictor of technology adoption (Gefen, Karahanna and Straub, 2003; Pavlou, Liang and Xue, 2007), this study moves beyond adoption to examine how trust shapes post-adoption use of workplace technologies. Specifically, we examine the following research question:

How does Trust in Technology relate to CSE and post-adoption technology use?

By integrating research on TRIT and CSE, this paper develops a unifying framework that illuminates how trust, a specific set of beliefs about technology, and CSE, a specific set of beliefs about individual ability, relate to post-adoption behavior.

LITERATURE REVIEW

Social Cognitive Theory and Self Efficacy

We use Social Cognitive Theory (SCT) to explain the mechanisms through which TRIT and CSE shape post-adoption technology use. SCT, introduced by Bandura (1977), is a cyclical framework that explains how people's internal states affect how they form their own environments, how their environments shape their behavior, and how their behavior affects their internal states (see Figure 1).

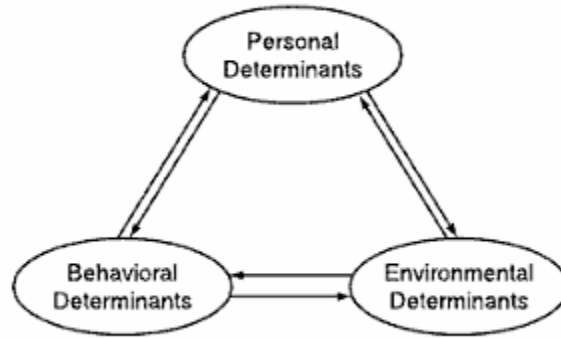


Figure 1: Social Cognitive Theory (adapted from Bandura, 2001)

SCT suggests that beliefs about ability are shaped by beliefs about outcomes of performing behavior. Past behavior, beliefs about ability and environment form a context for future behavior and affect each other in a cyclical fashion. In SCT, people's beliefs about their ability to accomplish goals drive their choice of behaviors. Their selection of, and attitude toward, activities mold their future behavior and experiences, which, through positive and negative outcomes, bring the process into a full circle by informing people's beliefs about their abilities (Bandura, 1977; Bandura, 2001; Compeau and Higgins, 1995).

Because SCT incorporates prior behavior and beliefs about the context, it provides a useful framework for examining post-adoption use of technology. For example, in a workplace where users repeatedly are presented with opportunities to use IT, the outcomes of those opportunities will shape users' beliefs, which will, in turn affect their behavior at the next opportunity to use technology. Having engaged in technology use, outcomes shape future perceptions of opportunities as well as abilities to realize positive outcomes of technology use (Compeau and Higgins, 1995).

Bandura coined self-efficacy as a term to describe people's beliefs about their abilities. In the SCT cycle, users' outcome expectations about behaviors with IT influence their selection of behaviors and environments. Self-efficacy, the belief that people hold regarding their own abilities to accomplish a given goal, largely determines individuals' outcome expectations that drive behavior (Bandura, 1986, Compeau and Higgins, 1995).

Computer Self Efficacy

CSE extends self-efficacy into the realm of technology tool use. Consistent with Compeau and Higgins (1995), it refers here to beliefs about broadly defined computer tasks (e.g. achieving a goal by using a system) and not specific sub-tasks, such as using the computer's mouse or entering values into a web form. CSE measures how well an individual believes they can use a computer. These beliefs are forward-looking; they reflect how well the individual believes that they will perform and not necessarily how well they have performed in the past.

Users with high CSE hold positive beliefs in their ability to accomplish tasks with hardware and/or software (Compeau and Higgins, 1995). For example, users who possess high CSE beliefs about Excel are likely to believe that they are capable of performing Excel-enabled tasks such as calculating a formula or creating a table (Marakas, Johnson and Clay, 2007). Because of their confidence in their own abilities, these users are more likely to anticipate positive outcomes from computer use and may look for new opportunities to use technology to surmount difficulties. Conversely, people who possess low CSE may behave defensively toward computers, avoiding interaction with IT beyond normal routine applications or uses mandated by their jobs.

Self Efficacy results from four mechanisms: affective states, enactive mastery experiences, vicarious experiences, and verbal persuasion (Bandura, 1997). Affective states are emotional conditions which may inhibit or encourage the development of CSE. We do not examine affective states affect in this paper. Enactive mastery experiences are episodes of successful use that contribute to Self Efficacy in a more powerful and general way than do the other sources of Self Efficacy (Bandura, 1997 p80). Vicarious experiences are observations of others engaged in successful systems use; as the subject observes the success of the other, the subject gains CSE in proportion to how like the other they believe themselves to be (Bandura, 1997, Compeau and Higgins, 1995). Vicarious experiences include "self-modeling," (Bandura, 1997) in which people observe their own success while following explicit directions or being guided through a software "wizard." Verbal persuasion is simply the effort to persuade people that they are or are not capable of performing a task (Bandura, 1997). As we will explain below, TRIT works through these mechanisms to influence the development of CSE, and, in doing so, affect post-adoptive use.

Trust in Technology

The literature suggests that trust shapes users' interaction with IT (Wang and Benbasat, 2005; Ratnasingham and Pavlou, 2003). Trust refers to a psychological state where one has favorable beliefs about, and is willing to depend upon another's attributes. Individuals extend trust based on their prior experience with a system and their expectations about its future performance. The more that users trust a system, the more likely they are to form higher beliefs about positive outcomes of using that technology.

TRIT reflects the extent to which people trust specific attributes of an IT (Thatcher et al., 2010). TRIT can be described as being reflected in three specific beliefs: Trusting Belief - Helpfulness, Trusting Belief - Functionality, and Trusting Belief - Reliability. Trusting Belief - Functionality refers to the belief that a system is capable of performing its role in accomplishing a goal. For example, when seeking to format a report in MS Word, functionality refers to one's belief that it has the features required to create a professional document. Trusting Belief - Helpfulness is the belief that a system's built-in help features are adequate to support effective use. For example, as one seeks that same report in MS Word, helpfulness refers to one's belief that the tutorials provide the guidance necessary to complete a necessary task. Trusting Belief - Predictability is the belief that a system will react to inputs in a predictable manner and not produce errors, produce inexplicable results, or react to user inputs in an unexpected way. For example, when attempting to use MS Word to complete that report, predictability is reflected in a user's belief that it will not crash. Limited research has tied a second-order reflective conceptualization of TRIT to intention to explore IT (Thatcher, et al., 2010). In this study, we seek to extend understanding of TRIT to explain CSE as well as post-adoptive behaviors, such as deep use and trying to innovate.

Post-Adoption Technology Use

Post-adoptive technology use refers to users' interaction with a familiar system. After adopting a technology, users vary in how extensively they utilize the features of the system and in their willingness to invest time in learning to apply the system in new ways (Nambisan, Agarwal, and Tanniru, 1999). The formation of post-adoptive usage patterns may be shaped by prior experience with technology (Jasperson, et al., 2005) as well as future outcome expectations about that technology's behavior (Compeau and Higgins, 1995).

Numerous post-adoptive behaviors have been examined in the literature (Hsieh and Zmud, 2006); this paper deals with two of them: Deep Use and Trying to Innovate with IT. Deep Use is users' accessing more of a system's functions and applying them to tasks. Deep Use opens up the possibility of using a system to its fullest potential (Burton-Jones and Straub, 2006). Trying to Innovate with IT refers to users' attempting to repurpose a system to help attain new goals (Ahuja and Thatcher, 2005). Next, we use attribution theory to tie CSE and TRIT to post-adoption technology use.

Trust, CSE and Post-Adoption Technology Use

When people approach an IT, they do so with the knowledge that successful use hinges not only on their own capabilities, but also those of the hardware and software (DeLone and McLean, 1992, 2004). Outcome expectations about specific characteristics of IT should shape individuals' belief about their ability to use that technology. Their outcome expectations may be formed, in part, by how much they trust the technology to perform its role. If they do not believe that the technology will be functional, helpful, and predictable, it stands to reason that they will expect a negative outcome from using the technology. Conversely, if they trust the technology, they will seek out opportunities to use it: positive TRIT should lead to deeper and more varied post-adoptive use.

Attribution Theory provides an explanation for how the relationship between beliefs about the technology and the self should influence post-adoption technology use. To whom users attribute the success of TRIT-building experiences is critical to whether or not they develop application-specific CSE. TRIT and CSE can both be described in terms of human attributions. Attribution theory (Kelley, 1973; Weiner, 1985) explains how people attribute causality to some event. The theory suggests that individuals tend to attribute causal explanations for an intention or behavior in a systematic fashion (Dubinsky et al., 1989) to features of a stimulus (object), themselves (person), the specific situation at hand, or some combination (Kelley, 1973).

A person attribution is internal to an individual, implying that a person perceives herself as being the cause of a behavior, for example on the basis of abilities. By contrast, an object attribution is external to an individual, meaning that a person perceives such objects as IT to be the cause of a behavior or feeling. Finally, a situation attribution is one in which a person attributes her behavior to the circumstances surrounding her (Kelley, 1973). Two of these categories, namely internal (e.g., individual abilities such as CSE) and external attributions (e.g., TRIT), apply to the IT domain (Marakas et al., 2000). Generally, because object attributions are external to an individual, they are more distant from action than are person

attributions (Zuckerman & Evans, 1984), which are internal. Person attributions therefore exert a stronger influence on behavior.

Internal attributions such as CSE assume that persons control computer functionality and are responsible for the outcomes generated from computer use (Johnson et al., 2006). In the case of CSE, this implies that individuals attribute performance expectations to their internal ability of using the technology. External attributions such as TRIT rest on the assumption that the technology is the cause of behaviors, performance, or feelings. Since CSE as a person attribution has a stronger influence on usage behavior, such feelings of high or low ability as CSE, which may be shaped by an individual's external or technology-oriented attributions or beliefs, can be expected to intervene in the relationship between trust and usage behavior.

Here, a practical example may help illustrate our reasoning. Imagine a person named Jane, who routinely uses Microsoft Excel[®] to create her monthly sales reports. Every time she has created a new report, Excel has performed predictably and without error, thus contributing to her belief in the reliability of Excel.

From time to time, Jane's manager has requested enhancements to the monthly report. Sometimes, when she didn't immediately know how to create these enhancements, the software's built-in menus and helpful tips guided her to success. Whenever that happened, her belief in the helpfulness of the software was bolstered as well corresponding beliefs about her ability to complete difficult tasks using Excel on her own.

Occasionally, Jane has been pressed for time and had to find a way to import data from other applications instead of inputting it manually. If she learned that Excel had a feature that allowed her to do this, then that would have increased her belief in the functionality of Excel as well as in her ability to use the software in new ways.

Now, after developing levels of trust in the software's reliability, helpfulness, and functionality, how optimistic is Jane going to feel about her ability to use Excel to accomplish completely new goals? How will the different ways that she developed trust inform her future task selections? Will she explore Excel's capabilities to see if it can be used to develop sales projections? Will she delve deeper into Excel's feature set, perhaps to completely automate the work she currently does manually?

Consistent with the relationship derived above from attribution theory, our example suggests that users' Trusting Beliefs about Excel shape their confidence in their ability to realize positive outcomes of computer use and influence their extended use of the software. In other words, TRIT works through CSE to affect post-adoptive behavior. CSE is, to an extent, the product of the Trusting Beliefs that a user has placed in technology. Episodes that diminish TRIT should lower users' CSE, leading to decreased positive outcome expectations and diminished deep or innovative technology use. When TRIT is high, on the other hand, CSE grows and leads to deeper, more innovative technology use.

HYPOTHESES DEVELOPMENT

Under the umbrella of social cognitive theory (Bandura, 1997), we used attribution theory (Kelley, 1973; Weiner, 1985) and the literature on Trusting Beliefs (e.g., Hsu et al., 2006; Pavlou et al., 2007; Ratnasingam et al., 2003) to develop an integrative model of trust and CSE (see Figure 2). Social cognitive theory provides the overarching framework for this study. SCT indicates that efficacy plays a central role in shaping technology use. This suggests that technology-oriented beliefs' influences on post-adoptive outcomes should be at least partially mediated by efficacy. The literature on trust suggests that technology-oriented beliefs may influence an individual's beliefs about ability and outcomes behavior. Finally, attribution theory allows for predictions about the relationship between external and internal causes of behavior, or between TRIT and CSE. Our model suggests that trust shapes CSE. Further, because internal attributions should exert a stronger influence on behavior than external attributions, we position efficacy as mediating the influence of TRIT on post-adoption behavior (Weiner, 1985). Construct definitions are provided in Table 3. Next, we turn to developing the logic behind our specific hypotheses.

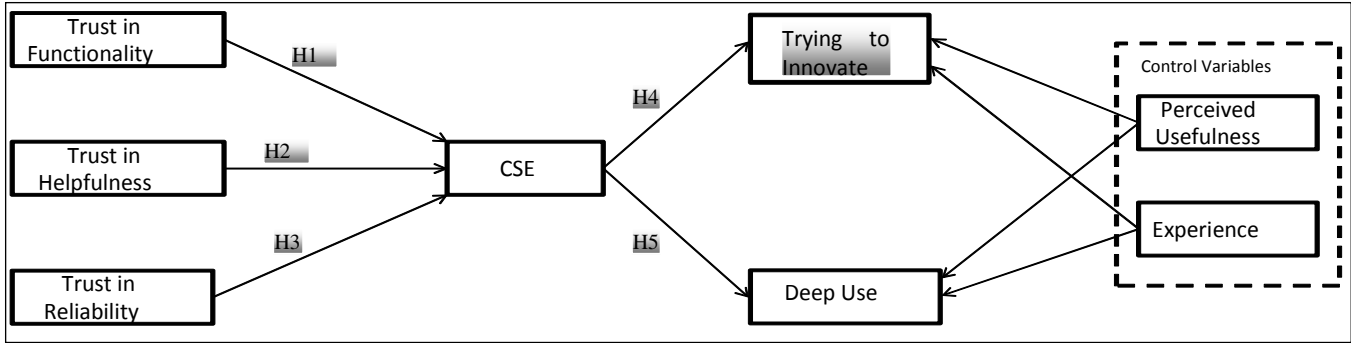


Figure 2: Research Model

Trusting Belief - Helpfulness	Belief that a system provides adequate help through built-in help functions integrated guidance.
Trusting Belief - Reliability	Belief that a system will react to inputs in a predictable manner.
Trusting Belief - Functionality	Belief that a system has the capabilities (features, etc.) required to do its part in accomplishing a goal.
Computer Self Efficacy	The extent to which a user believes they have the necessary skills to work with technology to achieve a goal.
Deep Use	Using more of a technology’s features to achieve new goals.
Trying to Innovate with IT	A user’s goal of finding new uses of existing workplace information technologies.

Table 1: Construct Definitions

Trust in Technology and Efficacy

TRIT refers to individuals’ beliefs about the functionality, helpfulness, and reliability of a specific system. In this paper, we examine each belief’s influence on efficacy. In terms of predicting post-adoption behavior, we place trust before efficacy. We do so, because attribution theory suggests that we can think of object and person attributions as ‘causes’ and ‘reasons’, respectively (Zuckerman & Evans, 1984). People generally perceive an object such as IT as a distant cause of behavior, since it is external to them. While such distant ‘causes’ can explain actions, they are farther apart from the immediate behavior than are internal reasons for acting, such as abilities. For example, while object-based trust can explain intentions and behavior, it may do so by influencing feelings of uncertainty (Pavlou et al., 2007) or ability. Essentially, such object-oriented beliefs as TRIT serve as stimuli that may cause a person to reason about the outcomes of behavior, which are a basic component of efficacy beliefs. By contrast, person attributions such as CSE are internal to an individual and relate to the individual’s direct reasoning about performing a behavior. Such task-related reasoning is very close to action and occurs in response to some stimulus (Zuckerman & Evans, 1984). For example, such feelings of high or low ability as CSE may be generated from an individual’s external or technology-oriented attributions.

Trusting Belief – Functionality, the belief that a user holds regarding the ability of a system’s ability to help attain a goal (Thatcher, et al., 2010), works on CSE through the avenue of enactive mastery. As users develop trust in a system’s functionality, they foster their optimism that they can use that system to surmount challenges in the workplace. We believe that this optimism is informed through experiences of enactive mastery: episodes of successful use would be interpreted by the user as indicative of their ability to accomplish tasks, in part because the features that they count on being in the system are going to be there when they need them. Thus:

H1: Trusting Belief - Functionality will positively relate to CSE

Trusting Belief - Helpfulness is a measure of the trust that a user has developed that a system helps them accomplish a task on their own. When users follow built-in system instructions or use similar helpful features, they are engaged in what Bandura called “self-modeling:” the act of observing themselves in a specialized situation, that of following instructions (Bandura, 1997). Also, by verbally indicating that the user can accomplish a task, built-in helpful features ay work through verbal persuasion to build CSE.

H2: Trusting Belief - Helpfulness will positively relate to CSE

Trusting Belief – Reliability, the belief that a system will operate in a predictable manner, informs CSE experiences of enactive mastery. Successful experiences with the system will elevate user’s CSE because they believe that they can count on the system behaving reliably and not undermining their efforts through unpredictable behavior.

H3: Trusting Belief - Reliability will positively relate to CSE

If a person has high CSE, they should expect positive outcomes from working with software to solve a problem (Compeau and Higgins, 1995; Thatcher, et al., 2010). When the most prominent features of their technology don’t directly address their challenges in an obvious manner, they might engage in deep use or explore new ways of using their trusted technology to solve their problems. A strong belief in their ability to work with a trusted system to accomplish tasks should help users generate positive outcome expectations when presented with new and unforeseen opportunities to use technology.

H4: CSE will positively relate to Trying to Innovate

H5: CSE will positively relate to Deep Use

DATA COLLECTION, ANALYSIS, AND RESULTS

Data were collected from 372 undergraduate students at a large public university in the northwestern United States. Using student subjects is generally considered reasonable when the phenomenon under investigation does not crystallize over time (Agarwal and Karahanna, 2000), as is the case with political views, for example (Sears, 1986). Crystallization over time cannot be expected for such constructs as Trying to Innovate (Ahuja and Thatcher, 2005), thereby deeming student data appropriate for our study. Furthermore, use of college students reduces the number of such potential confounding variables as education level (Ahuja and Thatcher, 2005), thereby increasing the internal validity of our results. Students participated voluntarily and received extra credit for participation. They were asked regarding their trusting beliefs, self-efficacy, and usage behaviors with Microsoft Excel[®]. Measures were adopted from prior literature and adapted were necessary to fit the Excel[®] context¹. All measures were modeled as reflective of their corresponding latent constructs. The instrument was pretested in a prior sample and minor adjustments were made. We controlled for experience with Microsoft Excel^{®2} as well as for the perceived usefulness of the software.

The model was analyzed using partial least squares (PLS), a structural modeling technique that employs a component-based approach to estimation (Chin, 1998). PLS estimation is generally recommended for predictive models with an emphasis on theory development (Fornell and Bookstein, 1982; Wold and Joreskog, 1982). Since our focus was indeed on theory development and we sought to analyze a prediction-oriented variance model, PLS was deemed appropriate for our study. SmartPLS 2.0 was used to conduct the analysis.

Measurement Model

The test of the measurement model includes the estimation of the reliability as well as the convergent and discriminant validity of the latent variable indicators. In PLS, the internal consistency reliability of a block of indicators is generally represented by the composite reliability measure. Acceptable values of this metric exceed 0.70 (Fornell and Larcker 1981) and are interpreted just like a Cronbach's coefficient alpha. All reliability measures were 0.90 or higher, thereby indicating sufficient internal consistency (see Table 2).

¹ Due to the strict limit of available space, we cannot provide detailed specifications of our measures in this work-in-progress. However, we will naturally do so in the full-length final version of the paper.

² Experience was measured by the number of years an individual has been working with Excel[®].

	Number of items	AVE	CR	Mean	SD	Range
Computer Self-efficacy	3	0.78	0.92	3.93	1.39	6.00
DeepUse	5	0.79	0.95	4.91	1.19	6.00
Experience	1	n/a*	n/a*	3.32	3.03	20.00
Perceived Usefulness	5	0.78	0.95	5.40	1.03	6.00
TB-Functionality	3	0.87	0.95	5.07	1.13	6.00
TB-Helpfulness	4	0.83	0.95	4.33	1.07	6.00
TB-Reliability	4	0.77	0.93	5.01	1.09	6.00
Trying to Innovate	5	0.66	0.90	3.96	1.08	6.00

AVE = Average Variance Extracted, CR = Composite Reliability; * not applicable to one-item measures

Table 2: Quality Criteria and Descriptive Statistics of Latent Variables

The convergent validity of a construct is generally considered adequate when its average variance extracted (AVE) is at least 0.50 (Fornell and Larcker, 1981). An AVE value in excess of 0.50 indicates that the majority of the variance is accounted for by the construct. The discriminant validity of a construct is generally considered adequate when the square root of the construct’s associated AVE is larger than the inter-construct correlations (Chin, 1998). All AVE values were above 0.65 (see Table 1) and the square root of the AVE for each construct was larger than the correlations of that construct with all other constructs in the model (see Table 3), indicating sufficient construct validity.³

	ICSE	DU	Exp	PU	Func	Help	Reli	Trying
Computer Self-efficacy	0.89							
DeepUse	0.38	0.89						
Experience	0.00	0.01	n/a*					
Perceived Usefulness	0.32	0.56	0.00	0.88				
TB-Functionality	0.45	0.53	-0.01	0.62	0.93			
TB-Helpfulness	0.48	0.42	-0.06	0.49	0.49	0.91		
TB-Reliability	0.35	0.46	-0.04	0.56	0.61	0.51	0.88	
Trying to Innovate	0.44	0.37	0.03	0.40	0.41	0.43	0.33	0.81

Diagonal Elements Are Square Roots of the Average Variance Extracted; * not applicable to one-item measures

Table 3: Latent Variable Correlations

Structural Model

Figure 3 presents the results obtained from the test of the hypothesized structural model. Following Chin (1998), a bootstrapping procedure with a random sample of 100 was used to generate t-values and standard errors. Interpreted as in multiple regression analysis, the R2 values of 0.27 and 0.36 for Trying to Innovate and Deep Use, respectively, indicate that the model explains a substantial amount of variance in different usage behaviors (Barclay et al. 1995). The results provide preliminary evidence for the hypothesized intervening role of CSE between trusting beliefs and different forms of usage behaviors. As shown in Table 4, the results support hypotheses 1, 2, 4, and 5. The indirect effects for both trust in helpfulness and functionality are significant and in the expected direction. Thus, the findings provide preliminary evidence that trusting beliefs have to manifest themselves in CSE to influence post-adoptive IT usage.⁴

³ Both convergent and discriminant validity are further confirmed when the loadings of individual indicators are above 0.50 on their associated latent variables and when the item loadings within constructs are higher than those across constructs (Chin 1998). While space limitations prevent us from presenting factor loadings and cross-loadings, the loadings did further confirm construct validity.

⁴ In the full-length final version of the paper, we will hypothesize and formally test for mediation (Sobel, 1982; Baron and Kenny, 1986).

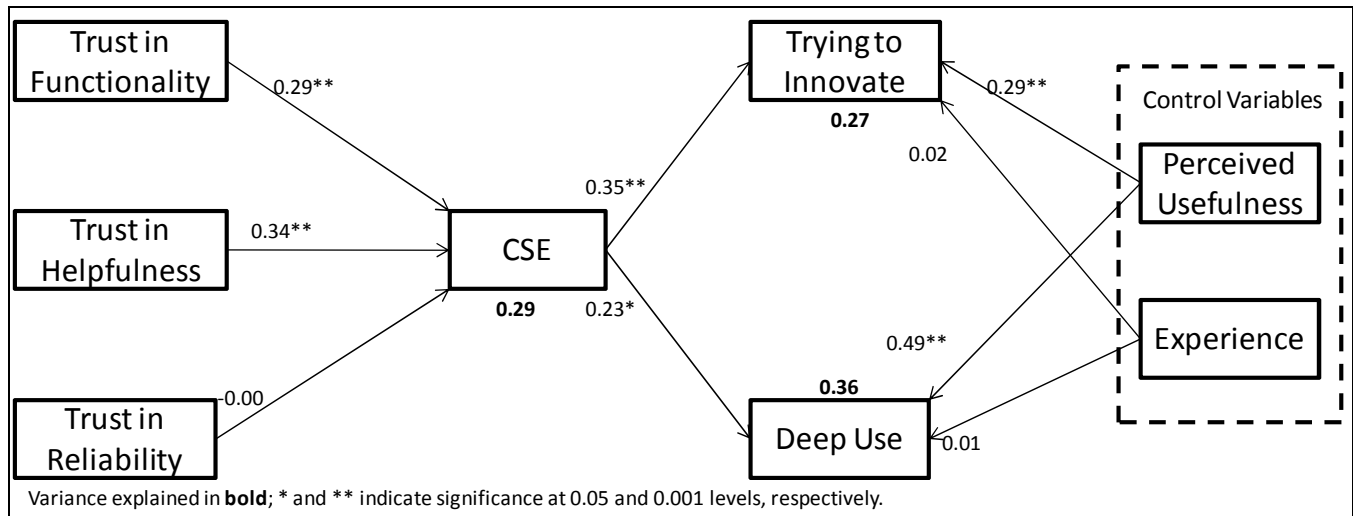


Figure 3: Data Analysis Results (model with only indirect effects).

Hypothesis	Support provided
H1: Trusting Belief - Functionality will positively relate to CSE	Supported**
H2: Trusting Belief - Helpfulness will positively relate to CSE	Supported**
H3: Trusting Belief - Reliability will positively relate to CSE	Not supported
H4: Computer Self-efficacy will positively relate to Deep Use	Supported**
H5: Computer Self-efficacy will positively relate to Trying to Innovate	Supported*

* and ** indicate significance at 0.05 and 0.001 levels, respectively.

Table 4: Summary of empirical evidence

CONCLUSION

This work in progress makes three major contributions. First, we show how TRIT affects post-adoptive system usage through its impact on CSE. Secondly, we propose and empirically validate the idea that self-efficacy has a strong direct effect on at least two forms of post-adoptive usage behavior: deep system use and trying to innovate with IT. Finally, we examine the interrelationship between TRIT and CSE in the post-adoption context and suggest – consistent with the postulation that trust is more distant from post-adoptive use than is efficacy – that TRIT works through the avenues of enactive mastery and verbal persuasion on CSE.

While we acknowledge that – despite their potential for increasing internal validity as outlined above – student data may often limit generalizability⁵, we are encouraged by the strong evidence found for the model; the vast majority of our hypotheses were supported. Furthermore, the findings that trusting beliefs in helpfulness and functionality lead to self-efficacy form the basis of the argument that helpful software features such as built-in help and wizards have benefits beyond their simple functions. This is consistent with the proposition that feature-centric aspects of technology are of great importance in post-adoptive technology usage (Jasperson et al., 2005) and yields important implications for systems design. Research on human-computer interaction can use these findings to analyze how trusting beliefs in functionality and helpfulness can be established. Practitioners can use our findings for implementing cost-effective alternatives to user training in an attempt to promote users’ self-efficacy.

⁵ The implications of this aspect for our study may be limited since internal and external validity generally tend to be at odds.

In the full-length final version of the paper, we will formally propose and test for the mediating role of CSE instead of the rather simplistic intervening role examined in this version. In so doing, we expect to make a contribution beyond the findings reported here. In particular, we expect to find the effect of TRIT on post-adoptive usage behavior to be *fully mediated* by computer-self efficacy. We strive to show through significant z-values in accordance with the Sobel (1982) test and through insignificant trusting beliefs once self-efficacy is included in the model (Baron and Kenny, 1986) that technology-oriented trusting beliefs have to fully manifest themselves in CSE so as to affect post-adoptive usage behavior. In the process, we will further explore the role of the trusting belief in reliability to better understand its non-significant impact on CSE.

In conclusion, this research in progress refines the literatures on trust, CSE, and post-adoptive IT usage by integrating these aspects into a parsimonious yet comprehensive model. It thereby contributes to all three literature streams and demonstrates the importance of examining the major technology acceptance drivers in an integrated manner in the post-adoption context.

REFERENCES

1. Agarwal, R. and Karahanna, E. (2000) Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage, *MIS Quarterly*, 24, 4, 665-694.
2. Ahuja, M. K. and Thatcher, J. B. (2005) Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use, *MIS Quarterly*, 29, 3, 427-459.
3. Bandura, A. (1977) Self-efficacy: Toward a unifying theory of behavioral change, *Psychological Review*, 84, 2, 191-215.
4. Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY US: W H Freeman/Times Books/ Henry Holt & Co.
5. Bandura, A. (1998) Self-efficacy: The exercise of control, *Self-Efficacy: The Exercise of Control*, NoPg.
6. Bandura, A. (2001) Social cognitive theory of mass communication, *Media Psychology*, 3, 3, 265-299.
7. Barclay, D., Higgins, C., Thompson, R. (1995) The partial least squares approach to causal modeling, personal computing adoption and use as an illustration. *Tech. Stud.* 2(2) 285–309.
8. Baron, R. M. and Kenny, D. A. (1986) The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations, *Journal of Personality and Social Psychology*, 51, 6, 1173-1182.
9. Burton-Jones, A. and Straub, D. W., Jr. (2006) Reconceptualizing system usage: An approach and empirical test, *Information Systems Research*, 17, 3, 228-246.
10. Chin, W. W. (1998). *Issues and opinion on structural equation modeling* MIS Quarterly & The Society for Information Management.
11. Compeau, D. R. and Higgins, C. A. (1995) Application of social cognitive theory to training for computer skills, *Information Systems Research*, 6, 2, 118-143.
12. Compeau, D. R. and Higgins, C. A. (1995) Computer self-efficacy: Development of a measure and initial test, *MIS Quarterly*, 19, 2, 189-211.
13. DeLone, W. H. and McLean, E. R. (1992) Information systems success: The quest for the dependent variable, *Information Systems Research*, 3, 1, 60-95.
14. DeLone, W. H. and McLean, E. R. (2004) Measuring e-commerce success: Applying the DeLone & McLean information systems success model, *International Journal of Electronic Commerce*, 9, 1, 31-47.
15. Dubinsky, A. J., Skinner, S. J. and Whittler, T. E. (1989) Evaluating sales personnel: An attribution theory perspective, *Journal of Personal Selling & Sales Management*, 9, 1, 9.
16. Fornell, C. and Bookstein, F. L. (1982) Two structural equation models: LISREL and PLS applied to consumer exit-voice theory, *Journal of Marketing Research (JMR)*, 19, 4, 440-452.
17. Fornell, C. and Larcker, D. F. (1981) Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research (JMR)*, 18, 1, 39-50.
18. Gefen, D., Karahanna, E. and Straub, D. W. (2003) Trust and tam in online shopping: An integrated model, *MIS Quarterly*, 27, 1, 51-90.
19. Hsu, M., Ju, T. L., Yen, C. and Chang, C. (2007) Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations, *International Journal of Human -- Computer Studies*, 65, 2, 153-169.

20. Jasperson, J. , Carter, P. E. and Zmud, R. W. (2005) A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems, *MIS Quarterly*, 29, 3, 525-557.
21. Johnson, R. D., Marakas, G. M. and Palmer, J. W. (2006) Differential social attributions toward computing technology: An empirical investigation, *International Journal of Human-Computer Studies*, 64, 5, 446-460.
22. Jones, E. E., Kanouse, D. E., Kelley, H. H., Nisbett, R. E., Valins, S., and Weiner, B. (1987) *Attribution: Perceiving the causes of behavior*. In Weiner B. (Ed.), Hillsdale, NJ England: Lawrence Erlbaum Associates, Inc.
23. Kelley, H. H. (1973) The processes of causal attribution, *American Psychologist*, 28, 2, 107-128.
24. Marakas, G. M., Johnson, R. D. and Clay, P. F. (2007) The evolving nature of the computer self-efficacy construct: An empirical investigation of measurement construction, validity, reliability and stability over time, *Journal of the Association for Information Systems*, 8, 1, 15-46.
25. Marakas, G. M., Johnson, R. D. and Palmer, J. W. (2000) A theoretical model of differential social attributions toward computing technology: When the metaphor becomes the model, *International Journal of Human-Computer Studies*, 52, 4, 719-750.
26. McKnight, D. H., Cummings, L. L. and Chervany, N. L. (1998) Initial trust formation in new organizational relationships, *Academy of Management Review*, 23, 3, 473-490.
27. Nambisan, S., Agarwal, R. and Tanniru, M. (1999) Organizational mechanisms for enhancing user innovation in information technology, *MIS Quarterly*, 23, 3, 365-395.
28. Pavlou, P. A. (2003) Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model, *International Journal of Electronic Commerce*, 7, 3, 101-134.
29. Pavlou, P. A. and Gefen, D. (2004) Building effective online marketplaces with institution-based trust, *Information Systems Research*, 15, 1, 37-59.
30. Pavlou, P. A., Liang, H. and Xue, Y. (2007) Understanding and mitigating uncertainty in online exchange relationships: A principal-agent perspective, *MIS Quarterly*, 31, 1, 105-136.
31. Ratnasingam, P. and Pavlou, P. (2003) Technology trust in internet-based interorganizational electronic commerce, *Journal of Electronic Commerce in Organizations*, 1, 1, 17.
32. Schunk, D. H. and Zimmerman, B. J. (2007) Influencing children's self-efficacy and self-regulation of reading and writing through modeling, *Reading & Writing Quarterly*, 23, 1, 7-25.
33. Sears, D. O. (1986) College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature, *Journal of Personality and Social Psychology*, 51, 3, 515-530.
34. Sobel, M. E. (1982) Asymptotic confidence intervals for indirect effects in structural equation models, *Sociological Methodology*, 290.
35. Thatcher, J. B., Zimmer, J. C. and Gundlach, M. J. (2008) Internal and external dimensions of computer self-efficacy: An empirical examination, *IEEE Transactions on Engineering Management*, 55, 4, 628-644.
36. Thatcher, J. B., McKnight, D. H., Baker, E. W., Arsal, R. E. and Roberts, N. (Forthcoming) The role of trust in post-adoption IT exploration: An empirical examination of knowledge management systems, *IEEE Transactions on Engineering Management*, Forthcoming.
37. Wang, W. and Benbasat, I. (2005) Trust in and adoption of online recommendation agents, *Journal of the Association for Information Systems*, 6, 3, 72-101.
38. Weiner, B. (1985) An attributional theory of achievement motivation and emotion, *Psychological Review*, 92, 4, 548-573.
39. Wold, H., K. Joreskog. 1982. *Systems Under Indirect Observation: Causality, Structure, Prediction*. North-Holland, Amsterdam, The Netherlands.
40. Zuckerman, M. and Evans, S. (1984) Schematic approach to the attributional processing of actions and occurrences, *Journal of Personality & Social Psychology*, 47, 3, 469-478.