

2011

Validation of a Model of Information Systems User Competency

Brenda Eschenbrenner

University of Nebraska at Kearney, eschenbrenbl@unk.edu

Fiona Fui-Hoon Nah

University of Nebraska at Lincoln, fnah@unlnotes.unl.edu

Follow this and additional works at: <http://aisel.aisnet.org/sighci2011>

Recommended Citation

Eschenbrenner, Brenda and Nah, Fiona Fui-Hoon, "Validation of a Model of Information Systems User Competency" (2011). *SIGHCI 2011 Proceedings*. 8.

<http://aisel.aisnet.org/sighci2011/8>

This material is brought to you by the Special Interest Group on Human-Computer Interaction at AIS Electronic Library (AISeL). It has been accepted for inclusion in SIGHCI 2011 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Validation of a Model of Information Systems User Competency

Brenda Eschenbrenner
University of Nebraska at Kearney
eschenbrenbl@unk.edu

Fiona Fui-Hoon Nah
University of Nebraska-Lincoln
fnah@unlnotes.unl.edu

ABSTRACT

IS user competency, or the ability to realize the fullest potential and the greatest performance from IS use, is important for IS users. However, which factors contribute to IS user competency is unclear. Based on the findings of previous research, a model of IS user competency was developed that focuses on IS-specific characteristics: (i) domain knowledge of and skills in IS, (ii) willingness to try and to explore IS, and (iii) capability of perceiving IS value. The model was validated using the survey approach and the findings suggest that all three factors are pivotal to IS user competency, with willingness to try and to explore IS being the most significant factor. The results suggest that IS user training should not only incorporate the requisite operational understanding of IS, but should also develop users' ability to understand the value of IS and, most importantly, their willingness to explore IS.

Keywords

IS User Competency, Willingness to Try and to Explore IS, Capability of Perceiving IS Value, Domain Knowledge of and Skills in IS

INTRODUCTION

The need to innovate and develop strategic advantages through IS usage, and to do so with greater expedition than one's competitors, has become the norm. Hence, developing IS user competency, or the *ability to realize the fullest potential and greatest performance from IS use* (Boudreau 2003, Eschenbrenner and Nah 2007, Marcolin et al. 2000) is of importance in organizations. Competency refers to "skills, behaviors, and capabilities that allow employees to perform specific functions" (Levy 2006, p. 78). However, it is not clear what set of skills, behaviors and capabilities are associated specifically with IS user competency. Hence, the research question is: *What are the relevant factors of IS user competency?*

LITERATURE REVIEW

In pursuit of discovering IS-specific factors associated with IS user competency, this research entailed validating the IS-specific factors identified in previous research (Eschenbrenner and Nah 2007) – domain knowledge of

and skills in IS, willingness to try and to explore IS, and capability of perceiving IS value.

The constructs from previous research that share similarities with domain knowledge of and skills in IS include *technology cognizance* (Nambisan et al. 1999), *IT knowledge* (Bassellier et al. 2003), and *ability to explore* (Nambisan et al. 1999). In comparing willingness to try and to explore IS with existing MIS constructs in the literature, similarities emerge with *personal innovativeness in the domain of IT* (Agarwal and Prasad 1998), *trying to innovate with IT* (Ahuja and Thatcher 2005), and *intention to explore a technology* (Nambisan et al. 1999). The most prominent similarities between capability of perceiving IS value and constructs in the MIS literature are with *perceived usefulness* (Davis 1989), *perceived value* (Kim and Kankanhalli 2009), and *technology cognizance* (Nambisan et al. 1999). However, none of the earlier works have tested the effect of these factors on IS user competency. Therefore, studying IS-specific factors in an IS user competency context has the potential to not only fill an important gap in the literature, but also create a more complete nomological network that associates these constructs with IS user competency.

THEORETICAL FOUNDATION AND HYPOTHESES

The objective of this research is to validate whether the three IS-specific factors – domain knowledge of and skills in IS, willingness to try and to explore IS, and capability of perceiving IS value – explains IS user competency (see Figure 1). In the previous study (Eschenbrenner and Nah 2007), these factors emerged in a grounded fashion from a qualitative study. In this section, we identify related theories to explain their relationships with IS user competency and generate hypotheses for this study.

Future Time Perspective Theory

To assess the relationship between capability of perceiving IS value and IS user competency, we draw on the Future Time Perspective Theory, which proposes that the utility value of a present factor or task for achieving a future goal or accomplishing a future task is important for persistence, motivation, and performance outcomes (Simons et al. 2000, 2003, 2004). Utility value is the perceived value that a particular factor acquires because one relates this factor as being instrumental in achieving

certain outcomes, which can be either long-term or short-term goals (Simons et al. 2004). For IS users, being able to perceive the value of IS may influence achieving future goals such as attaining IS user competency. If individuals can perceive the value of utilizing IS, they may be more likely to achieve IS user competency.

H1: Capability of perceiving IS value will positively influence IS user competency.

According to Simons et al. (2004), “future time perspective theorists also value...the utility of what is learned for the future.” (p. 345). In regard to the cognitive aspects of future time perspectives, individuals can comprehend the long-term implications of behaviors (De Volder and Lens 1982). Research findings have shown that individuals with high GPAs and persistence in their studies attached greater value to future goals and to studying hard to reach these future goals than those with lower GPAs and less study persistence. Therefore, those with greater knowledge or skills (i.e., higher GPAs) identified greater value in studying to achieve future goals. In an IS context, this may imply that having knowledge and skills in IS can influence the value one assigns to IS or the understanding of the benefits and opportunities that might be obtained with IS. Therefore, domain knowledge of and skills in IS is hypothesized to influence capability of perceiving IS value.

H2: Domain knowledge of and skills in IS will positively influence capability of perceiving IS value.

Theory of Trying

The theory of trying, an extension of both the theory of planned behavior (Ajzen 1985) and the theory of goal pursuit (Bagozzi and Edwards 1998), proposes that trying is a reflection of action and some aspects of actual behavior (Ahuja and Thatcher 2005). Trying has been referred to as “mental and physical activities leading up to and regulating the instrumental acts directly producing goal attainment” (Bagozzi and Edwards 1998, p. 598). Arguments have been made that if individuals are constrained by a lack of resources, they may not be interested in engaging in exploration (Thatcher et al. 2003). Researchers have proposed that “in order to effectively utilize a new technology in an innovative manner...Organizational actors need to understand *both* what the technology is capable of providing, as well as how it might best be utilized within the constraints imposed by the existing organizational environment and work processes (Nambisan et al. 1999, 371). In the context of IS, having domain knowledge of and skills in IS is expected to increase one’s willingness to explore or attempt to try IS.

H3: Domain knowledge of and skills in IS will positively influence willingness to try and to explore IS.

As referred to in the Theory of Trying, trying is a reflection of action and satisfying all of the necessary conditions for performance of a particular behavior (Mathur 1998). Also, trying is associated with the activities that provide the structure for actions to occur and achieve certain outcomes (Bagozzi and Edwards 1998). Therefore, if one is in a state of willingness to try and to explore, this could provide the condition for certain behaviors to occur and outcomes to be realized.

Previous MIS research has cited that innovating with technologies can result in realizing the full potential of IT (Ahuja and Thatcher 2005). Therefore, in the context of IS user competency, willingness to try and to explore IS may result in IS user competency or the ability to realize the fullest potential and the greatest performance from IS use. Suggestions have also been made that users may acquire an initial introduction and awareness to a particular technology, but the knowledge gained needs additional refinement through interaction with the technology (Nambisan et al. 1999). Hence, although domain knowledge may be acquired (which can thereby influence one’s willingness to try and to explore IS as proposed by (H3), one’s willingness to try and to explore IS is needed to develop IS user competency, which is hypothesized as follows.

H4: Willingness to try and to explore IS will positively influence IS user competency.

Theory of Expert Competence

According to the Theory of Expert Competence, competency is dependent upon domain knowledge, associated psychological traits, cognitive skills, effective decision strategies, and appropriate task characteristics such that competency can be applied (Shanteau 1992). The knowledge, just like expertise, is domain specific. Therefore, developing expert competence in a particular domain requires prerequisite knowledge or content knowledge, but the expertise will only be developed for that particular domain (Shanteau 1989, 1992). Various research studies have been cited that indicate the importance of domain knowledge (or referred to as a common core of knowledge) for expert performance to be realized (Libby and Luft 1993; Bonner and Lewis 1990; Einhorn 1974).

Previous research has identified that employees who were expected to become proficient IT/IS users needed significant amounts of knowledge and assistance to achieve this (Lee 1986) and “in general, participants with better IS domain knowledge have been found to perform better than those with less domain knowledge” in contexts such as program comprehension (Khatri et al. 2006, p. 83). Also, previous research studies have demonstrated the importance of IS and application domain knowledge in tasks such as comprehending conceptual schemas and problem-solving in various contexts (Khatri et al. 2006). Hence, domain knowledge of and skills in IS is expected to influence IS user competency.

H5: Domain knowledge of and skills in IS will positively influence IS user competency.

RESEARCH METHODOLOGY

The proposed research model was tested utilizing a survey research method. The target population for this survey is individuals who are IS users and who utilize IS for business-related tasks. A nation-wide insurance company in the Midwest was utilized for the research. Control variables were added to the survey to assess the perceptions that participants have on their control over the ability to innovate with IS, versus being restricted to routine usage.

The factor measurement items for the full-scale survey were refined based on the results of a pilot study. All items were assessed on a 7-point Likert scale, with 1 being strongly disagree and 7 being strongly agree. The sample size for the full-scale survey is 596 participants. Participants averaged 11 years of work experience with the current organization, and 23 years of total work experience. For IS experience, participants averaged 19 years of IS experience. Considering that two introductory questions were included in the survey to affirm that they were IS users and utilized IS in a business-context, and the extensive experience with IS, this sample is deemed appropriate for the current study.

DATA ANALYSIS

Reliability analysis was conducted utilizing Cronbach's alpha coefficients and all four factors achieved acceptable levels above .90. Also, items were reviewed for internal consistency – ensuring that no items have low corrected-item total correlations (i.e., below .5) and no improvements in Cronbach's alpha coefficients occur if any item was removed. Based on this review, no issues were noted and all items appear internally consistent.

Statistical analyses were conducted to assess reliability, skewness and kurtosis, common method variance, and discriminant and convergent validity. Results of analyses were acceptable and because of the presence of some non-normality, a logarithmic transformation of the data was performed. Covariance-based structural equation modeling using maximum likelihood (ML) estimation was utilized to assess the measurement and structural model. A measurement model for all factors was analyzed to provide support for the assumption of unidimensionality, with the final model achieving acceptable fit, $\chi^2(395) = 2555.594, p < .001, CFI = .901, RMSEA = .096, SRMR = .088$. Although the chi-square statistic is significant, this can be attributed to the large sample size. The structural model, which also achieved acceptable fit, suggests that all direct paths to IS user competency are significant – capability of perceiving IS value ($B = 0.092; p = .006$), domain knowledge of and skills in IS ($B = 0.125; p = .001$), and willingness to try and to explore IS ($B = .603; p < .001$) (see Figure 1). Also, other significant paths include the paths from

domain knowledge of and skills in IS to capability of perceiving IS value ($B = 0.237; p < .001$) and willingness to try and to explore IS ($B = 0.402; p < .001$). The model accounts for 46.4% of the variance in IS user competency.

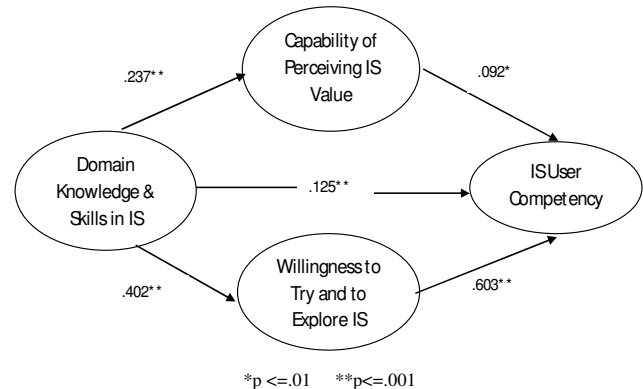


Figure 1. Research Model

DISCUSSION OF FINDINGS

Based on the results from this research study, all five hypotheses are supported. In other words, domain knowledge of and skills in IS influence IS user competency both directly and indirectly through capability of perceiving IS value and willingness to try and to explore IS. Hence, one's understanding of IS will enhance one's ability to identify the benefits and opportunities that IS can provide. Knowledge and skills in IS will also influence one's propensity to explore and willingness to try to use IS, as well as one's IS user competency.

Capability of perceiving IS value and willingness to try and to explore IS directly influence IS user competency. The results suggest that if an IS user is able to recognize the potential of IS, this perception can influence their IS user competency. Also, if an IS user is willing to engage in utilizing IS and experimenting with it, this can also increase their level of IS user competency. Interestingly, the results suggest that the factor that has the most significant, direct influence on IS user competency is willingness to try and to explore IS. Hence, the most important factor in improving an IS user's ability to utilize IS to its fullest potential and obtain the greatest performance from IS use is one's willingness to be exploratory with IS and one's attempt to use IS. Therefore, in this research, we derived a parsimonious and validated model to understand IS user competency.

CONTRIBUTIONS AND IMPLICATIONS

This research study provides support for the Future Time Perspective Theory, Theory of Trying, and Theory of Expert Competency in an IS user competency context. Therefore, based on the propositions of the Future Time Perspective Theory, being able to understand the benefits and opportunities of IS is important to obtaining the greatest performance from IS. Contributing to this

capability of perceiving IS value is an individual's domain knowledge of and skills in IS. The results are consistent with valuing the "utility of what is learned for the future" (Simons et al. 2004, p. 345). Hence, having the knowledge of IS and the ability to operate IS can influence the value that one can perceive in IS.

In regard to the Theory of Trying, the findings provide support for the antecedent of domain knowledge of and skills in IS influencing one's willingness to try and to explore IS. Consistent with the suggestions of research participants from the previous research study (Eschenbrenner and Nah 2007), competent IS users have the capability to attempt new activities. Also, the research results provide support for the importance of willingness to try and to explore to realize IS user competency. In fact, this factor has more influence than domain knowledge of and skills in IS as well as capability of perceiving IS value. Consistent with the Theory of Expert Competency, competency is dependent on an individual's knowledge and skills in a particular domain. In particular, expertise in an IS competency domain is dependent on an individual's IS knowledge and IS capabilities, which is consistent with previous expert performance studies (e.g., Bonner and Lewis 1990).

Based on the factors that were studied in this research, practitioners may consider creating or restructuring future training that focuses on strengthening or developing these core IS-specific factors. For example, circumstances may need to be intentionally staged such that individuals have an opportunity to try and to explore IS, and are encouraged to make themselves vulnerable to making mistakes with IS.

Future IS training or interventions may entail emphasizing or assisting in understanding the benefits, opportunities, and value that IS can provide. Previous research has found that more successful IS development occurred when a department improved its perceptions of IS value versus a department that did not experience these perception improvements (Bannister 2002). Hence, interventions can include exercises in which individuals improve upon their capability of perceiving IS value.

LIMITATIONS AND FUTURE RESEARCH

Potential limitations include the generalizability of the findings to other organizations, industries, and technologies. Hence, the generalizability of these findings needs to be tested in other organizations and industries. Future research can be conducted to further examine additional factors that may impact IS user competency such as managerial and organizational factors that may enhance or constrain IS user competency. Future research may evaluate IS training and interventions to assess the resulting IS user competency achieved which can provide further insights into the importance of these factors.

CONCLUSIONS

This research study contributes to the understanding of IS-specific factors associated with IS user competency. More specifically, a model comprising IS-specific factors and their relationships with IS user competency was validated through a survey study. The results of the survey revealed that all three factors are important to IS user competency, with willingness to try and to explore IS having the greatest influence. Therefore, although it's very important for individuals to perceive the benefits and opportunities of IS and possess the ability to use IS, it's even more important for IS users to be willing to attempt to use IS and experiment with it. Overall, identifying the factors of IS user competency may shed light onto promising areas for future research as well as enhance the potential for improvements in IS proficiency.

REFERENCES

1. Agarwal, R. and Prasad, J. (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology, *Information Systems Research*, 9, 2, 204-215.
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. Ajzen, I. (1985) From intentions to actions: A theory of planned behavior, in *Action Control: From Cognition to Behavior*, J. Kuhl and J. Beckmann (Eds.), Springer, New York, 11-39.
4. Bagozzi, R. and Edwards, E. (1998) Goal setting and goal pursuit in the regulation of body weight, *Psychology and Health*, 13, 593-621.
5. Bannister, F. (2002) Sustained delivery of value: The role of leadership in long-term IS effectiveness, *Evaluation and Program Planning*, 25, 151-158.
6. Bassellier, G., Benbasat, I., and Reich, B. (2003) The Influence of business managers' IT competence on championing IT, *Information Systems Research*, 14, 4, pp. 317-336.
7. Bonner, S. and Lewis B. (1990) Determinants of auditor expertise, *Journal of Accounting Research (Supplement)*, 28, 3, 1-20.
8. Boudreau, M.-C. (2003) Learning to use ERP technology: A causal model, in *Proceedings of 36th Annual Hawaii International Conference on System Sciences*, 235-243.
9. Davis, F.D. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13, 3, 319-340.
10. De Volder, M.L. and Lens, W. (1982) Academic achievement and future time perspective as a cognitive-motivational concept, *Journal of Personality and Social Psychology*, 42, 3, 566-571.

11. Einhorn, H. (1974) Expert judgment: Some necessary conditions and an example, *Journal of Applied Psychology*, 59, 5, 562-571.
12. Eschenbrenner, B.L. and Nah, F. F.-H. (2007) Understanding highly competent information system users, *SIGHCI 2007 Proceedings*, paper 17.
13. Khatri, V., Vessey, I., Ramesh, V., Clay, P., and Park, S. (2006) Understanding conceptual schemas: Exploring the role of application and IS domain knowledge, *Information Systems Research*, 17, 1, 81-99.
14. Kim, H., and Kankanhalli, A. (2009) Investigating user resistance to information systems implementation: A status quo bias perspective, *MIS Quarterly*, 33, 3, 567-582.
15. Lee, D. (1986) Usage patterns and sources of assistance to personal computer users, *MIS Quarterly*, 10, 4, 313-325.
16. Levy, P.E. (2006) *Industrial/Organizational Psychology* 2nd edition, Houghton Mifflin Company, Boston, MA.
17. Libby, R. and Luft, J. (1993) Determinants of judgment performance in accounting settings: Ability, knowledge, motivation and environment, *Accounting, Organizations, and Society*, 18, 5, 425-450.
18. Marcolin, B.L., Compeau, D.R., Munro, M.C., and Huff, S.L. (2000) Assessing user competence: Conceptualization and measurement, *Information Systems Research*, 11, 1, 37-60.
19. Mathur, A. (1998) Examining trying as a mediator and control as a moderator of intention-behavior relationship, *Psychology & Marketing*, 15, 3, 241-259.
20. Nambisan, S., Agarwal, R., and Tanniru, M. (1999) Organizational mechanisms for enhancing user innovation in information technology, *MIS Quarterly*, 23, 3, 365-395.
21. Shanteau, J. (1989) Psychological characteristics and strategies of expert decision makers, in *Advances in Decision Research*, B. Rohrmann, L.R. Beach, C.Vlek, and S.R. Watson (Eds.), North Holland, Amsterdam, 203-215.
22. Shanteau, J. (1992) Competence in experts: The role of task characteristics, *Organizational Behavior and Human Decision Processes*, 53, 2, 252-266.
23. Simons, J., Dewitte, S., and Lens, W. (2000) Wanting to have vs. wanting to be: The effect of perceived instrumentality on goal orientation, *British Journal of Psychology*, 91, 335-351.
24. Simons, J., Dewitte, S., and Lens, W. (2003) 'Don't Do It for Me. Do It for Yourself.' Stressing the personal relevance enhances motivation in physical education, *Journal of Sport & Exercise Psychology*, 25, 145-160.
25. Simons, J., Dewitte, S., and Lens, W. (2004) The role of different types of instrumentality in motivation, study strategies, and performance: Know why you learn, so you'll know what you learn!, *British Journal of Educational Psychology*, 74, 3, 343-360.
26. Thatcher, J., Srite, M., Stepina, L., and Yongmei, L. (2003) Culture, overload and personal innovativeness with information technology: Extending the nomological net, *Journal of Computer Information Systems*, 44, 1, 74-81.
- 27.