IDEA GROUP PUBLISHING

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033-1240, USA
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com

ITP4913

A Replication of the Post-Acceptance Model in the Context of E-Learning

Anne Mathisrud Sørebø
Faculty of Education in Business Administration, Buskerud University College, Norway, anne.soreb@hibu.no

ABSTRACT

This paper investigates whether Bhattacherjee's (2001) findings from his test of a Post-Acceptance Model in a consumer setting, could be generalized to an organizational IS-user setting. To address this issue, the paper starts with a brief description of the Post-Acceptance Model. Thereafter the paper describes the empirical approach in the present study. In contrast to Bhattacherjee's (2001) study, the present study cannot emphasize the importance of perceived usefulness for the users' continuance intentions. However, the results of this study indicate that confirmation and satisfaction are the important predictors of the users' continuance intentions.

INTRODUCTION

Bhattacherjee (2001) seminal work on information systems (IS) continuance intentions makes two important contributions to our understanding of user acceptance. First, it presents a strong case for an in-depth examination of a proposed separation between users' initial acceptance of a new information technology (IT), and their long-term acceptance of IT that they are experienced with. The latter being a question of so-called IS-continuance intention; i.e. the users' demonstrated willingness to employ a new technology for the tasks it is designed to support beyond a period of first-time use[1] or testing. Second, Bhattacherjee's work provides a theoretical framework, namely expectation-confirmation theory (ECT), as a basis for explaining IS continuance intention. Bhattacherjee converted the ECT framework, which originally explain repurchase intention, to a Post-Acceptance Model (PAM) consisting of four variables as shown in Figure 1 (cf. "theory and research model" section). While perceived usefulness and satisfaction represents established and important individual level concepts in IS research, both confirmation and IS continuance intention is genuine new concepts within the field. All concepts in Figure 1 will be defined in the next section.

A valid test of a theory's suitability, i.e. like PAM, to explain real world phenomena depends on proper replications, extensions, and generalizations (Rosenthal 1991; Tsang and Kwan 1999). Such replications play an important role in the construction of IS knowledge (Berthon et al. 2002) and can realize the building of a cumulative tradition in IS (Benbasat and Zmud 1999; Sambamurthy 2001). Because PAM is promising in its explanation of a critical IS research issue, i.e. the users continuance intentions, further investigation of this framework is necessary. The present study seeks to replicate Bhattacherjee's work on consumers' use of e-banking and investigate if it is possible to generalize his research findings to lecturers' use of e-learning.

THEORY AND RESEARCH MODEL

As indicated previous, the theoretical grounding for this research comes from the work of Oliver (1980) which founded *Expectation-Confirmation Theory* (ECT) as a conceptual framework to explain repurchase. Bhattacherjee (2001) adapted ECT to the particular domain of post-acceptance of computer technology, converting the mixed pre/post consumption ECT model to a pure post-acceptance IS model (cf. Figure 1). The process by which users reach continuance intentions in a PAM framework is as follows (Bhattacherjee 2001). First, users form an initial expectation of a specific technology prior to usage. Second, they accept and use the actual technology. Following a period of initial use, they form perceptions about its performance (i.e. Perceived usefulness). Third, they assess its perceived performance vis-à-vis their original expectations and determine the extent to which their expectations is confirmed (i.e. Confirmation). Forth, they form a satisfaction, or affect, based on their confirmation level and expectation on which that confirmation was based. Finally, satisfied users form a IS continuance intention, while dissatisfied users discontinue its subsequent use.

For a more detailed description of the constructs in PAM and justification for the paths, we refer to Bhattacherjee 2001.

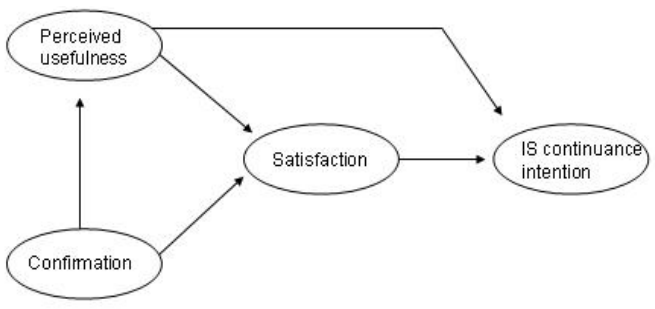
METHODS

Three different university colleges, where an e-learning tool was made available to all faculty members, agreed to participate in the study. Since variables and items had been used in previous research efforts and found reliable with acceptable validity (cf. Bhattacherjee 2001), a questionnaire was developed as the vehicle for data collection. The language of the questionnaire was Norwegian. English items were first translated into Norwegian and then back into English by a second person to ensure wording reliability. An early version of the instrument was presented to 10 prospective respondents who where asked about their own and their coworkers present e-learning usage. The same individuals filled in a close-to-final version of the instrument without the researchers being present, but encouraged to write comments if items were found to be ambiguous or non-understandable. Valuable questionnaire improvements were made at each of these steps.

Figure 1: A Post-Acceptance Model of IS Continuance

Construct	Definition
Perceived usefulness	Users' perception of the expected benefits of IS use.
Confirmation	Users' perception of the congruence between expectation of IS use and its actual performance.
Satisfaction	Users' affect with (feeling about) prior IS use.
IS continuance intention	Users' intention to continue using a IS.

Table 1: Construct definitions



This conference paper appears in the book, Innovations Through Information Technology, edited by Mehdi Khosrow-Pour. Copyright © 2004, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

The questionnaire was distributed using an internal post system to all faculties at the three different sites. Only they who utilized an e-learning tool in connection with ordinary on-site courses were asked to return the questionnaire. These were the members who had a real choice to discontinue their use of the e-learning tool the subsequent semester. Returns were by ordinary mail. By the end of March 2003, 135 usable questionnaires were returned, for a response rate of 33 percent. The low response rate may be attributed to a lot of factors. Among these, the important factors may be that not all the faculty members utilize tools in connection with ordinary on-site courses, and further, that some of the faculty members only utilize e-learning in connection with distance teaching. A prior report from one of the participating institutions demonstrated that 47 percent of the faculty utilized e-learning in connection with on-site courses in 2001. Assuming that this is somewhat equal for the two other institutions and further, that there has been a small increase in the use, our conclusion is that the response rate is satisfactorily. However, the question of importance is connected to how representative the sample is.

Thirty-two percent of the respondents were women and the remaining sixty-eight percent were men. This corresponds with the gender distribution at the three university colleges. The average respondent was 45 years old (i.e. 1% below thirty, 23% in the thirties, 51% between 40 and 54, and 25% above fifty-five), held a master degree, and had 15 years of prior experience using computers. In sum, these distributional data indicates a representative sample.

The recommended two step procedure of checking item data quality measurement before hypothesis and relationship testing was followed (Anderson and Gerbing, 1988). Items were checked for skewness and kurtosis, and were found to have unproblematic univariate distributional characteristics (i.e. values below 2.0). In the sample 104 questionnaires contained no missing values and 125 questionnaires had 5 or less missing values. The rest, i.e. 9 questionnaires, had 9 or less missing values.

ANALYSIS

Four constructs were measured in this study: IS continuance intention, satisfaction, usefulness, and confirmation (cf. Appendix A). Construct validity for the four measurement scales was assessed via confirmatory factor analysis (CFA) using the LISREL program. Each scale item was modeled as a reflective indicator of its hypothesized latent construct.

The first step in scale validation was to examine the goodness-of-fit of the overall CFA model. For models with good fit, it is suggested that chi-square normalized by degrees of freedom ($\div^2$/df) should not exceed 5, and the goodness of fit indices NNFI and CFI should both exceed 0.9. For the initial measurement model $\div^2$/df was 2.78 (i.e. 272/98), NNFI was 0.93, and CFI was 0.94, suggesting adequate model fit. However, some of the factor loadings were below the recommended threshold (i.e. 0.7) and some of the standardized residuals exceeded the recommended cut-off value 3.0. In practice, it is common to find at least several measurement items in an estimated model having loading below the 0.7 threshold. Especially when newly developed items are employed, a more suitable cut-off value of 0.4 or 0.5 is considered sufficient (Hulland 1999). Using the latter criterion together with the standardized residuals threshold of 3.0, we dropped 5 out of 15 items (cf. asterisk in Appendix A) to achieve a valid measurement model. All retained items had loadings of at least 0.5 and the measurement model obtained significantly improvement in the fit indices; model $\div^2$/df was 1.41 (i.e. 41/29), NNFI was 0.98, and CFI was 0.99; which suggests satisfactorily model fit.

Convergent validity in the final measurement model was evaluated using the three criteria suggested by Fornell and Larcker (1981): (1) factor loadings should be significant, (2) construct reliabilities should exceed 0.80, and (3) average variance extracted (AVE) by each construct should exceed the variance due to measurement error (i.e. AVE should exceed 0.50). All factor loadings were significant at p = .001 (see t-values in Table 2). AVE ranged from 0.57 to 0.84 (see Table 2), greater than variance due to measurement error. Hence, all three conditions for convergent validity were met.

Table 2: Reliability Information and Test of Convergent Validity

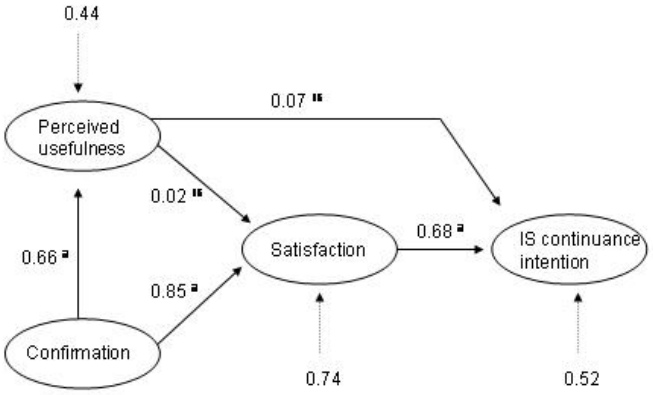
	Factor loading	T-value	Error term	Item reliability	Average variance ext.	Composite reliability
Continuance intention						
Item 1	0.87	11.50	0.25	0.75	0.57	0.79
Item 2	0.53	6.10	0.72	0.28		
Item 4	0.82	10.74	0.32	0.68		
Satisfaction						
Item 1	0.96	14.62	0.07	0.93	0.84	0.91
Item 2	0.86	12.20	0.26	0.74		
Usefulness						
Item 2	0.81	10.75	0.34	0.66	0.68	0.87
Item 3	0.85	11.55	0.28	0.72		
Item 4	0.81	10.84	0.33	0.67		
Confirmation						
Item 1	0.82	11.04	0.32	0.68	0.71	0.83
Item 3	0.86	11.72	0.26	0.74		

Table 3: Squared Correlations among Constructs & Average Variance Extracted

	Continuance		Satisfaction		Usefulness		Confirmation		AVE
Continuance	1.0	-	0.73	*0.53*	0.47	*0.22*	0.55	*0.30*	0.57
Satisfaction	0.73[a]	*0.53*[b]	1.0	-	0.58	*0.34*	0.87	*0.76*	0.84
Usefulness	0.47	*0.22*	0.58	*0.34*	1.0	-	0.66	*0.44*	0.68
Confirmation	0.55	*0.30*	0.87	*0.76*	0.66	*0.44*	1.0	-	0.71

[a]: correlation. [b]: squared correlation

Figure 2: LISREL Analysis of Research Model



To assess discriminant validity among the constructs, Fornell and Larcker (1981) suggests the use of average variance extracted (AVE), which is the average variance shared between a construct and its measures. As Table 3 shows, the AVE values are consistently greater than the off-diagonal squared correlations, suggesting satisfactorily discriminant validity at the construct level.

The five hypotheses, implicit in PAM, were tested collectively using the structural equation modelling (SEM) approach, also performed using LISREL. Each indicator was modelled in a reflective manner (as in CFA), the four constructs were linked as hypothesized (see Figure 1), and model estimation was done using the maximum likelihood technique.

The goodness-of-fit of the structural model was comparable to that of the previous measurement model. Model $\div^2$/df was 1.48 (i.e. 49/30),

Copyright © 2004, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

NNFI was 0.98, and CFI was 0.99. These metrics provided evidence of adequate fit between the hypothesized model and the observed data.

Next, the path significance of each hypothesized association in the research model and variance explained (R^2 value) by each path were examined. Figure 2 shows the standardized path coefficients and path significances, as reported by LISREL ($^{a}p< .001$, ^{ns}non significant). Three out of five hypothesized paths in the model were significant (i.e. at $p < 0.001$). Implications of these results for generalization of PAM are discussed in the next section.

DISCUSSION

Comparing the results from our study of continued use of e-learning technology with Bhattacherjee's (2001) study of electronic banking, some interesting patterns emerge. Perceived usefulness was a moderate predictor of satisfaction and continuance intentions in Bhattacherjee's (2001) study, while it was a non-significant predictor in the present e-learning setting. This is a somewhat remarkable finding, since perceived usefulness in a lot of studies is demonstrated to consistently influence user intention across temporal stages of IS use (Karahanna et al. 1999). Our finding may of course be due to setting specific conditions, e.g. the respondent group is not engaged in the usefulness of e-learning in on-site education, they only use it because the students demand the technology (i.e. a type of social influence). Otherwise, our findings may be attributable to methodological problems.

If we compare the unexpected finding above with the effect from confirmation (i.e. on satisfaction) and satisfaction (i.e. on continuance intention) in our study, it becomes evident that confirmation and satisfaction may be most important predictors in an e-learning setting. In other words, our findings demonstrates clearly that faculty members' perceptions of whether their expectations is fulfilled predict their affective feelings about the use of e-learning technology ($R^2 = 0.74$), and further, their affective feelings predict their intention to continue using an e-learning technology ($R^2 = 0.39$). Such a finding has important implications for practitioners (e.g. universities director of information technology) who want to maximize their return of investments in e-learning technology: educate old (continued) users on how to carry out e-learning effectively so as to maximize their confirmation and satisfaction with use of e-learning technology.

The purpose of this study was to replicate Bhattacherjee's (2001) PAM and investigate if it was possible to generalize his research findings from a consumer setting to organizational members' use of e-learning. The results presented here indicate that the important predictors of faculty members continued use of e-learning technology is confirmation and satisfaction. Our finding that perceived usefulness was of no importance for their continued use appears as paradoxical. In conclusion, we should be careful with generalizing Bhattacherjee's (2001) findings to all types of IS and user settings. Future studies should challenge this statement and continue to develop the theoretical predictions in PAM, and hence, perform empirical tests in new user settings.

REFERENCES

Anderson, J.C. & Gerbing D.W. "Structural equation modeling in practice: A review and recommended two-step approach," Psychological Bulletin, (103:3), 1988, pp. 411-423.

Benbasat, I. and Zmud, R.W. "Empirical Research in Information Systems: The practice of relevance," MIS Quarterly (23:1), 1999, PP. 3-16.

Berthon, P., Pitt, L., Ewing, M., and Carr, C.L. "Potential research space in MIS: A framework for envision and evaluationg research replication, extension and generalization," Information Systems Research (13:4), 2002, pp. 416-427.

Bhattacherjee, A. "Understanding information systems continuance: An expectation-confirmation model," Management Information Systems Quarterly (25:3), 2001, pp. 351-370.

Karahanna, E., Straub, D.W., Chervany, N.L. "Information technology adoption across time: A cross-sectional comparison of pre-adoption and postadoption beliefs, MIS Quarterly, (23:2), 1999, pp. 183-213.

Rosenthal, R. "Replication in behavioural Research," in Replication Research in the Social Sciences, J.W. Neuliep (ed.), Sage, Newbury Park, CA, 1991, pp. 1-30.

Fornell, C. & Larcker, D.F. "Evaluating structural equation models with unobservable variables and measurement error", Journal of Marketing Research, (18), 1981, pp. 39-50.

Hulland, J. "Use of partial least squares (PLS) in strategic management research: A review of four recent studies", Strategic Management Journal, (20), 1999, pp. 195-204.

Oliver, R.L. "A cognitive model of the antecedents and consequences of satisfaction decisions," Journal of Marketing Research, 17(Nov.), 1980, pp. 460-469.

Tsang, E.W.K., and Kwan, K.M. "Replication and Theory Development in Organizational Science: A critical realist perspective," Academy of Management Review (24:4), 1999, pp. 759-780.

Sambamurthy, V. "Research in information systems: What we haven't learned," MIS Quarterly (25:4), 2001, pp. 10-11.

APPENDIX A: QUESTIONNAIRE ITEMS

IS continuance intention: (Bhattacherjee 2001) – using a Likert type scale ranging from 1(strongly disagree) to 7(strongly agree)

CI1: I intend to continue using ClassFronter rather than discontinue its use.

CI2: My intentions are to continue using ClassFronter rather than use any alternative means.

* CI3: If I could, I would like to discontinue my use of ClassFronter (*reverse coded*).

CI4: My intentions are to continue using ClassFronter, at least as active as today, in the future (New item developed)

Satisfaction (Bhattacherjee 2001)) – using a Likert type scale ranging from 1 to 7

How do you feel about your overall experience of ClassFronter use?

S1: Very dissatisfied/Very satisfied.

S2: Very displeased/Very pleased.

* S3: Very frustrated/Very contented.

* S4: Absolutely terrible/Absolutely delighted.

Percieved usefulness (Bhattacherjee 2001) – using a Likert type scale ranging from 1 (strongly disagree) to 7(strongly agree)

* PU1: Using ClassFronter improves my teaching performance.

PU2: Using ClassFronter increases my productivity in managing my teaching everyday job.

PU3: Using ClassFronter enhances my effectiveness in managing my teaching everyday job.

PU4: Overall, ClassFronter is useful in managing my teaching responsibilities.

Confirmation (Bhattacherjee 2001) – using a Likert type scale ranging from 1 (strongly disagree) to 7(strongly agree)

C1: My experience with using ClassFronter was better than what I expected.

* C2: The service level provided by ClassFronter was better than what I expected.

Copyright © 2004, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

C3: Overall, most of my expectations from using ClassFronter were confirmed.

ENDNOTES

[1] The authors define the timeframe of "first-time use" as a context dependent construct. In connection with B2C electronic commerce it may refer to the first-time the user place an order, and in connection with e-learning it may refer to the first-semester lecturers employ the technology in a learning environment.

Copyright © 2004, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/proceeding-paper/replication-post-acceptance-model-context/32337

Related Content

Image Segmentation Using Rough Set Theory: A Review
Payel Roy, Srijan Goswami, Sayan Chakraborty, Ahmad Taher Azarand Nilanjan Dey (2014). *International Journal of Rough Sets and Data Analysis (pp. 62-74).*
www.irma-international.org/article/image-segmentation-using-rough-set-theory/116047

A Comparative Analysis of a Novel Anomaly Detection Algorithm with Neural Networks
Srijan Das, Arpita Dutta, Saurav Sharmaand Sangharatna Godboley (2017). *International Journal of Rough Sets and Data Analysis (pp. 1-16).*
www.irma-international.org/article/a-comparative-analysis-of-a-novel-anomaly-detection-algorithm-with-neural-networks/186855

Knowledge Fusion Patterns for Context Aware Decision Support
Alexander Smirnov, Tatiana Levashovaand Nikolay Shilov (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 599-611).*
www.irma-international.org/chapter/knowledge-fusion-patterns-for-context-aware-decision-support/112373

Autonomic Execution of Web Service Composition Using AI Planning Method
Chao-Qun Yuanand Fang-Fang Chua (2015). *International Journal of Information Technologies and Systems Approach (pp. 28-45).*
www.irma-international.org/article/autonomic-execution-of-web-service-composition-using-ai-planning-method/125627

Methods and Techniques of Data Mining
Ana Funesand Aristides Dasso (2021). *Encyclopedia of Information Science and Technology, Fifth Edition (pp. 749-767).*
www.irma-international.org/chapter/methods-and-techniques-of-data-mining/260226