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The Expectance-Confirmation Model of IS Continuance: A Replication in a Scandinavian E-Bank Context

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ABSTRACT

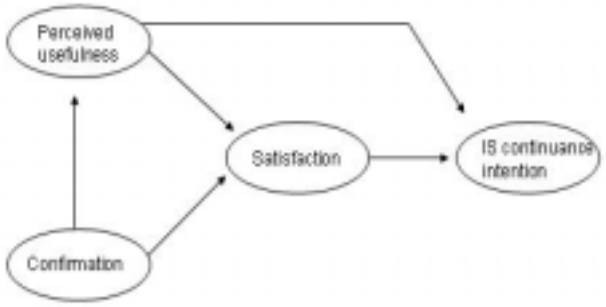
This paper investigates whether Bhattacherjee's (2001) findings from his test of the Expectation-Confirmation Model of IS continuance in a consumer setting in USA, could be generalized to an equal consumer setting in Scandinavia. To address this issue, the paper starts with a brief description of the Expectation-Confirmation Model of IS continuance. Thereafter the paper describes the empirical approach in the present study. The result indicates that perceptions of benefits (perceived usefulness) may be the key factor to explain consumers' continuance intentions, also in a different national context. In contrast to Bhattacherjee's (2001) study, our Scandinavian study does not confirm a relationship between satisfaction and continued intention to use the technology.

INTRODUCTION

Bhattacherjee's (2001) key work, on information systems (IS) continuance, 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 and long-term acceptance of information technology (IT). The latter being a question of so-called IS-continuance; i.e. the users' demonstrated willingness to employ a technology for the tasks this specific technology is designed to support, beyond a period of first-time use[1]. Second, it provides a theoretical framework, namely expectation-confirmation theory (ECT), as a basis for explaining IS continuance. Bhattacherjee converted the ECT framework, which originally explains repurchase intention, to an Expectation-Confirmation Model of IS continuance. This model consists of four variables as shown in Figure 1.

While *perceived usefulness* and *satisfaction* represents established and important individual level concepts in IS research, both *confirmation* and *IS continuance* intention are genuine new concepts within the field. All concepts in Figure 1, is defined in table 1. Further discussion will be made in the next section.

Figure 1. Expectation-Confirmation Model of IS Continuance



A valid test of a theory's suitability, like the Expectation-Confirmation Model, 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 contribute to the building of a cumulative tradition in IS (Benbasat and Zmud 1999; Sambamurthy 2001). Since the Expectation-Confirmation Model 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 replicates Bhattacherjee's work on consumer's use of e-banking in the United States of America and investigates the possibility to generalizing his findings to a similar context in Scandinavia.

THEORY AND RESEARCH MODEL

As previously indicated, the theoretical basis for this research comes from the work of Oliver (1980). Oliver which founded *Expectation-Confirmation Theory* (ECT) as a conceptual framework in order to explain repurchases. Bhattacherjee (2001) adapted ECT to the 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). According to The Expectation-Confirmation Model, users reach continuance intentions to the following process (Bhattacherjee 2001): 1) Users form an initial expectation of a specific technology prior to usage. 2) They accept and use the actual technology. 3) After a period of initial use, they develop perceptions about its performance (i.e. *Perceived usefulness*). 4) They assess the perceived performance vis-à-vis their original expectations, and determine the extent to which their expectations are confirmed (i.e. *Confirmation*). 5) They form a *satisfaction*, or affect, based on their confirmation level, and the expectation on which that confirmation was based. 6) Finally, satisfied users develop an *IS continuance intention*, while dissatisfied users discontinue further use.

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

Table 1. Construct Definitions

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

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METHODS

Empirical data was collected in a cross-sectional field survey of e-banking users. Survey respondents were customers of a local bank in a small town in Scandinavia. The sample consisted of all e-bank customers, i.e. 1648 customers. Since variables and items had been used in previous research efforts and found reliable with acceptable validity (cf. Bhattacherjee 2001), a web-based questionnaire was developed as the vehicle for data collection. An early version of the instrument was presented to 10 prospective respondents who where encouraged to write comments if items were found to be ambiguous or non-understandable. Valuable questionnaire improvements were made at each of these steps.

A letter that invited customers to answer our web-based questionnaire was placed on the local bank's home page. The headline in the letter informed the consumers that in answering the questionnaire, they would automatically participate in a lottery. The lottery had 150 dollar as first prize, and all participants got various free gifts for completing the questionnaire. After two weeks of data collection, 435 usable responses were obtained; this gives a response rate of about 26%.

The recommended two step procedure of checking measurement quality of the items before hypothesis and relationship testing was followed (Anderson and Gerbing, 1988). An initial test of the data demonstrated serious problem with the univariate distribution in the dependent construct (i.e. continuance intention). The skewness values for the four items were 5 in average and the kurtosis values were 20 in average. Both these values exceed the recommended upper limit in the literature and could be characterized as extreme values. In order to solve this problem we excluded the respondents who had replied "strongly agree" on all four items. We ended up with 94 respondents for our data analysis. The skewness values were between 1 and 2, and the kurtosis values were between 0 and 3.

37% of the respondent in the final respondent group were women and 63% were men. The average respondent was 35 years old (10% below twenty five, 34% between twenty five and thirty five, 29% between thirty five and fifty, and 20% above fifty), and held a university degree. The respondents had more than 5 years of experience in using computers and 3 years experience with using electronic bank services. The screening of the demographic variables indicated that there was no considerable difference between the initial sample of 435 respondents and the final sample of 94 respondents.

Analysis

Four constructs were measured in this study: *IS continuance intention*, *satisfaction*, *usefulness*, and *confirmation*. 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 (χ^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 χ^2/df was 2,67 (i.e. 224.3/84), NNFI was 0.88, and CFI was 0.91, 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 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 χ^2/df was 1.77 (i.e. 51.26/29), NNFI was 0.94, and CFI was 0.96; 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, the cut-off values for the t-values = 2 (see t-values in Table 2). Construct reliabilities exceeded 0.80 for two of the construct, and was close to 0.80 (0.76) for the construct continuance intention. AVE ranged from 0.53 to 0.81 (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..98	10.51	0.05	0.96	0.53	0.76
Item 2	0..54	5..38	0.70	0.29		
Item 3	0..59	5..91	0.65	0.34		
Satisfaction						
Item 2	0.87	9.71	0.24	0.75	0.66	0.86
Item 3	0.75	8.17	0.42	0.56		
Item 4	0.81	8.85	0.34	0.65		
Usefulness						
Item 2	0.75	7.88	0.42	0.56	0.70	0.82
Item 4	0..91	9.78	0.17	0.83		
Confirmation						
Item 1	1.0	11.33	0.00	1.0	0.81	0..90
Item 2	0.79	8.39	0.37	0.62		

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 the Expectation-Confirmation Model of IS continuance, 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 ÷²/df was 1.85 (i.e. 55.60/30), NNFI was 0.93, and CFI was 0.95. 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 by each path (R^2 value) were examined. Figure 2 shows the standardized path coefficients and path significances, as reported by LISREL. Three out of five hypothesized paths in the model were significant (i.e. at p < 0.05). Implications of these results for generalization of the Expectation-Confirmation Model of IS continuance, are discussed in the next section.

DISCUSSION

The purpose of this study was to replicate Bhattacherjee's (2001) Expectation-Confirmation Model of IS continuance, and investigate the possibility to generalize his research findings from USA to Scandinavia. The comparison of our findings with Bhattacherjee's findings (Table 4) demonstrates clearly that 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 the Expectation-Confirmation

Table 3. Squared Correlations Among Constructs & Average Variance Extracted

	Continuance	Satisfaction	Usefulness	Confirmation
Continuance	**0.53**	0.01	0.44	0.28
Satisfaction	0.01	**0.66**	0.08	0.13
Usefulness	0.44	0.08	**0.70**	0.31
Confirmation	0.28	0.13	0.31	**0.81**

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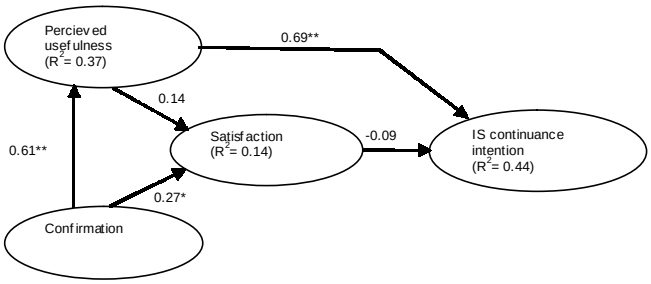
Figure 2. LISREL Analysis of ResearchModel



*Path significance: **p < .001, *p < .05*

Table 4. Bhattacherjee's Findings vs Findings in the Present Study

Path	Bhattacherjee's findings	The present study
Perceived usefulness -> IS continuance intention	0.29	0.69
Satisfaction -> IS continuance intention	0.57	-0.09^{ns}
Perceived usefulness -> Satisfaction	0.23	0.14^{ns}
Confirmation -> Satisfaction	0.53	0.27
Conformation -> Perceived usefulness	0.45	0.61

Model of IS continuance, and hence, perform empirical tests in both new user settings and toward various types of technologies.

As Table 4 demonstrates, perceived usefulness was a moderate predictor of both satisfaction and continuance intentions in Bhattacherjee's (2001) study, while it only predicted continuance intentions in our study. The fact that perceived usefulness seems to be an important predictor of continuance intentions is not unexpected, since perceived usefulness is demonstrated to consistently influence user intention across temporal stages of IS use, in a lot of studies (Karahanna et al. 1999). However, the lack of association between satisfaction and continuance intention in our study was surprisingly. This may indicate that instrumental beliefs (i.e. beliefs about benefits) are more important than feelings, for shaping continuance intentions. A closer examination of our findings indicates that the important path may go from confirmation via perceived usefulness and toward continuance intentions. The message from such a finding to managers of e-banking is simply that they should first and foremost communicate information about benefits of using e-banking to their consumers. They should first provide new e-bank users with matter-of-fact information about benefits; i.e. ensuring expectations that can be fulfilled through actual use. Then they should offer experienced users' information or tips about how to utilize the e-banking solution more effectively.

Like all cross-sectional research the present study has some limitations. This data collection approach does not allow explicit directional tests. This does not mean that the causal relationships we have specified in Figure 1 and 2 are void. The theoretical arguments for the ECM model provide support for the existence of causal relationships among constructs but also structural equation analysis. In spite of the support for causal relationships in survey research, conclusive statements about causality cannot be made since alternative explanations cannot be ruled out. Longitudinal design is the approach that should be employed to settle the issue.

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ENDNOTES

[2] The authors define the timeframe of "first-time use" as a technology dependent construct. In connection with business-to-consumer electronic commerce may "first-time use" refer to the first-time the user place an order and in connection with e-banking it may refer to the first time a consumer utilize the functions inherent in a e-banking solution.

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