



## The role of task-technology fit as users' motivation to continue information system use

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### ABSTRACT

In this study, we extend and combine the post-acceptance model (PAM), proposed by Bhattacharjee [Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation–confirmation model. *MIS Quarterly*, 25(3), 351–370], with aspects of Goodhue and Thomson's theory of task-technology fit (TTF). The original PAM emphasizes cognitive beliefs and user feelings as factors that may influence a person's intention to continue to use an information system (IS). The variables added from TTF are task-technology fit and utilization. The sample consists of data that measure use and use-related aspects of an e-learning tool among university college teachers. Using structural equation modeling, results indicate that variables from TTF as well as variables from PAM explain users' IS continuance intention. As a result of these findings, we propose the existence of two different and autonomous paths from the independent variables to the dependent variable of IS continuance intention. These two paths are: a work system-centric path through utilization of the information system, and an IT-centric path through user satisfaction.

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### 1. Introduction

The quest for constructs and variables that may explain the use of information systems (IS) remains a salient endeavor in academic and practitioner communities. Using Fishbein and Ajzen's theory of reasoned action as the baseline (Fishbein & Ajzen, 1975), two schools of thought have evolved. The first builds on the notion of adoption. It addresses initial use of IS as in the technology acceptance model (TAM) (Brown, Massey, Montoya-Weiss, & Burkman, 2002; Davis, 1989). The second addresses continued use of IS, based on the post-acceptance model of IS continuance (PAM) (Bhattacharjee, 2001).

Over the last two decades, the amount of research within the TAM umbrella has been vigorous (Venkatesh, 2008). The area of TAM is described as one of the most mature contemporary IS research approaches (Chau, 1996; Taylor & Todd, 1995).

The area of IS continuance has not enjoyed a comparable level of attention. Due to the relatively lack of systematic effort and a low number of publications, it can be said that the area is, to some degree, immature. Still, the number of publications addressing various aspects of IS continuance is increasing (e.g., Hayashi, Chen, Ryan, & Wu, 2004; Limayem & Cheung, 2008; Thong, Hong, & Tam, 2006). Research on IS continuance can be divided into three somewhat

overlapping groups. The first group consists of studies employing IS adoption as an independent variable for explaining IS continuance (e.g., Chiu, Hsu, Sun, Lin, & Sun, 2005; Lin, Wu, & Tsai, 2005; Roca, Chiu, & Martínez, 2006). In the second group, one finds studies of mechanisms explaining the evolution of continued use over time. These publications are an elucidation of established continuance theory (e.g., Cheung & Limayem, 2005; Kim & Malhotra, 2005). The third group consists of studies trying to integrate the originally proposed IS continuance theory (PAM) with complementary theoretical perspectives (e.g., Hsu & Chiu, 2004; Hsu, Chiu, & Ju, 2004; Mellarkod, Appan, & Browne, 2005; Liao, Chen, & Yen, 2007).

The present research belongs in this third group. Our starting point is the post-acceptance model of IS continuance (Bhattacharjee, 2001), and our additional inspiration is the renewed focus on socio-technical theory (Mumford & Weir, 1979; Mumford, 2000). In a series of publications, Alter (2001a, 2001b, 2003, 2005) strongly argues that the academic discipline of IS must return its focus to the relationship between technology and work. Alter (2003) claims that IS use cannot be understood unless the actual work carried out is also accounted for. The assertion is that unless the functionality that an IS offers coincides with the needs of getting work done, people will not continue using IS (Allen, 1998; Ferratt & Vlahos, 1998).

### 2. Theoretical background

The post-acceptance model of IS continuance draws on expectation–confirmation theory in consumer behavior (Oliver, 1980). In

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Bhattacharjee's first publication in this area, the change made to the original theory involved transforming the mixed pre/post consumption assertion into a pure post-acceptance model (Bhattacharjee, 2001). The new theory was labeled the post-acceptance model of IS continuance. The variables and relationships are shown in Fig. 1 (cf., variable names in italics).

The post-acceptance model seeks to explain IS users' intention to continue (or discontinue) to use an IS. The model builds on the assumption that users, after an initial acceptance and a period of initial use, form an opinion of the extent to which their pre-acceptance expectations are confirmed (cf. *confirmation*.) Simultaneously, the users develop opinions about benefits (cf. *perceived usefulness*). After a period of use, a degree of confirmation and perceived usefulness develops, and both of these will influence the users' perceived satisfaction with the IS (cf. *satisfaction*). Finally, the perceived usefulness and satisfaction contribute to explaining the users' willingness to continue to use the IS (cf. *IS continuance intention*).

Research on socio-technical issues has employed a healthy variety of research designs and methods. A very precise exploration of the links between work-related matters and the use of technology is Goodhue and Thompson's task-technology fit theory – the objective being a balanced expression of task related aspects and IT support (Goodhue & Thompson, 1995). The theory postulates that the degree of fit between tasks and technology (support), will impact work performance and technology utilization. The task-technology fit model has five key constructs, *task characteristics* (e.g., routine or non-routine tasks), *technology characteristics* (e.g., degree of stability), *task-technology fit*, *performance impact* and *utilization*. As we will explain in the next section, two of these constructs are included in our research model (cf. Fig. 1 with variable names in bold type).

### 3. Research model and hypotheses

As previously stated, the main argument for extending the post-acceptance model using selected core concepts from the task-technology fit model is to move theory development in the direction of including work-related issues into our understanding of the use of technology in an organizational setting. Our main proposition is that the task-technology fit model has considerable potential in explaining the users' continuance intention.

In particular, we agree with the technology-to-performance chain as specified by Goodhue and Thompson's task-technology fit theory. Accordingly, we propose that the variable perceived task-technology fit will, in the extended post-acceptance model, impact both perceived usefulness and utilization. The extended post-acceptance model is shown in Fig. 1.

Hypotheses 5 to 9 in Fig. 1, address relationships in the original post-acceptance model (Bhattacharjee, 2001). We do not repeat them, but continue with our arguments for the new and extended relationships, i.e., **Hypotheses 1-4**.

The users' utilization (of an IS) is hypothesized to be an antecedent of IS continuance intention. We build this statement on the argument that acceptance in the long term is not only a question of accepting an IS *per se*, but first and foremost a question of accepting the functions it offers. We posit that this process unfolds as the individual user actively chooses to explore, adopt, and broaden the use of the IS's functions after initial acceptance (Jasperson, Carter, & Zmud, 2005). The assertion that higher levels of IS-utilization will strengthen the users' intention to continuing their use, is indirectly supported through studies where the argument is that prior behavior (i.e., acceptance of functions) is the most important antecedent of future behavior (i.e., continued use of the functions) (Bagozzi & Kimmel, 1995; Conner & Armitage, 1998; Davis & Venkatesh, 2004; Norman & Smith, 1995). We therefore propose the first hypothesis:

**H1.** Utilization level is positively associated with IS continuance intention.

We build the next hypothesis on the notion that an increased utilization level occurs because users take advantage of specific functions. This will lead to greater user satisfaction (DeLone & McLean, 2003; Gelderman, 1998). The literature is ambiguous on whether IS use is a predictor of user satisfaction. In their 1992-publication, DeLone and McLean assert that use and user satisfaction are two closely related variables – and they specify a bi-directional path between them (DeLone & McLean, 1992). In their 2003 revisit, DeLone and McLean emphasize that we need to measure IS use as something more than pure frequency, and they suggest utilization level as an alternative (DeLone & McLean, 2003). DeLone and McLean assert that positive experience with IS use will lead to increased user satisfaction, and specify a causal path from use to user satisfaction. It is noteworthy that publica-

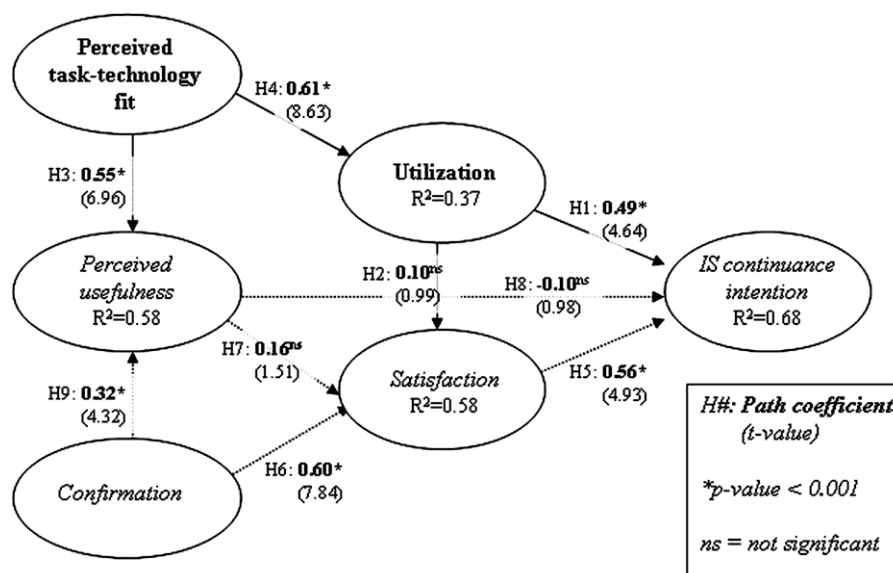


Fig. 1. PLS analysis of the extended post-acceptance model.

tions in the discipline of marketing look at it from the opposite direction; the more satisfied the customer is, the higher the amount of use (Bolton & Lemon, 1999; Danaher & Roland, 1996). Although these counter arguments exist, we prefer DeLone and McLean interpretation and hypothesize that utilization of IS's specific functions will impact user satisfaction. We think the relationship particularly holds when the utilization of the technology is voluntary; a person will take advantage of aspects of an IS that contribute to personal goals but stay away from functionality that does not contribute, hence we postulate Hypothesis 2:

**H2.** Utilization level is positively associated with user satisfaction.

Perceived usefulness is an indicator of the degree to which the use of an IS will enhance a user's job performance. In other words, there is no substantial difference between the concept of "performance impacts" in task-technology fit theory and the concept of "perceived usefulness" in the post-acceptance model.

Goodhue and Thompson argue that the degree of task-technology fit, defined as a matter of how the capabilities of the IS match the tasks that the user must perform, is a major factor in explaining job performance levels (Goodhue & Thompson, 1995). The positive scenario is that the more a technology meets specific work task characteristics, the higher is the probability that the technology will contribute to an improved job performance (Goodhue, Klein, & March, 2000; Jarvenpaa, 1989; Vessey, 1991). We suggest the next hypothesis:

**H3.** Perceived task-technology fit is positively associated with perceived usefulness.

As an abstraction, utilization is basically a measure of the behavior of employing an IS in completing different tasks (Goodhue & Thompson, 1995). The prerequisite for this particular behavior is that individual users find the IS's functionality relevant for the execution and completion of work tasks. When users actively choose to continue to explore, adopt, use and extend the use of one or more of the IS's functions, the mechanism behind this is quite likely that the perceived task-technology fit influences their choice of function utilization. We propose a fourth hypothesis:

**H4.** Perceived task-technology fit is positively associated with utilization level.

#### 4. Methods

The items (see Table 1) used to operationalize the variables in our research model were adapted from acknowledged literature, with a few changes in wording reflecting the IS targeted in our sample and the specific user context. Instruments on the traditional post-acceptance variables were adapted from Bhattacharjee (2001). The perceived task-technology fit instrument was based on a short form of the compatibility instrument from Taylor and Todd (1995). Since compatibility refers to how the user finds the use of a

**Table 1**  
Item means, standard deviations, and internal consistencies.

Reflective	Mean	SD	Loading	t-Stat
<i>Perceived task-technology fit (Composite reliability = 0.79/0.92)<sup>a</sup></i>				
Using e-learning technology fits with the way I work <sup>b</sup>	4.77	1.59	0.93	24.42
Using e-learning technology does not fit with my practice preferences <sup>c</sup> (reverse coded)	4.34	1.69	0.28	1.58
Using e-learning technology fits with my educational practice	4.61	1.67	0.92	43.29
<i>Perceived usefulness (Composite reliability = 0.92)</i>				
Using e-learning improves my teaching quality	4.42	1.65	0.85	25.76
Using e-learning makes my students more satisfied with my teaching	4.55	1.51	0.78	18.72
Using e-learning increases the control with my teaching plans	4.23	1.92	0.84	22.23
Using e-learning enables me to accomplish teaching tasks more quickly	3.43	1.96	0.73	13.37
Using e-learning makes it easier to do my job as a teacher	4.16	1.80	0.82	21.05
E-learning is a useful tool in my teaching	5.01	1.66	0.87	32.96
<i>Formative Utilization (Composite reliability = 0.81)</i>				
I make information about the courses available (e.g., plan of progress, literature references, etc.)	6.17	1.37	0.39/0.76	2.11/9.73
I make necessary messages available (e.g., changes of classroom, deadlines, etc.)	5.96	1.52	0.05/0.67	0.27/6.61
I make educational material available (e.g., documents, presentations, proposal for solutions, etc.)	5.76	1.76	0.47/0.87	2.73/13.9
I make multiple choice or other tests for my students	2.03	1.76	0.24/0.44	1.95/5.46
I utilize the electronic mail function for sending mail to my students (e.g., group mail or single mail)	4.96	2.09	0.25/0.63	1.83/5.48
I receive reports from projects, etc.	4.36	2.29	0.16/0.52	1.17/4.55
I establish and utilize discussion forums for my students	2.97	1.97	0.03/0.41	0.15/3.45
I establish closed student groups (e.g., in connection with the students project work)	3.38	2.35	0.12/0.28	0.78/2.08
<i>Reflective Confirmation (Composite reliability = 0.94)</i>				
My experience with using e-learning was better than what I expected	4.30	1.51	0.91	41.66
The service level provided by e-learning was better than what I expected	4.06	1.44	0.93	58.06
Overall, most of my expectations from using e-learning were confirmed	4.49	1.41	0.90	31.50
<i>Satisfaction (Composite reliability = 0.88/0.94)</i>				
Based on my experience with e-learning, I am very contented with using the system	4.71	1.35	0.94	93.31
Based on my experience with e-learning, I am very dissatisfied with using the system (reverse coded)	5.31	1.51	0.90	43.75
Based on my experience with e-learning, I am delighted with the system	3.10	1.51	0.67	7.83
<i>IS continuance intentions (Composite reliability = 0.83/0.86)</i>				
I intend to continue using e-learning rather than discontinue its use	6.16	1.31	0.87	12.92
My intentions are to continue using e-learning rather than use any alternative means	6.22	1.24	0.52	3.20
If I could, I would like to discontinue my use of e-learning (reverse coded)	5.92	1.91	0.75	7.79
My intentions are to continue using e-learning in the future, at least as active as today	5.96	1.32	0.80	11.52

<sup>a</sup> Composite reliability = initial coefficient/coefficient after one item is removed.

<sup>b</sup> The items were translated from English to Norwegian.

<sup>c</sup> Removed item in italics.

technology to be consistent with existing work practice, we considered this to be a suitable short-form measure of perceived task-technology fit. Finally, the utilization instrument was adapted from Igarria and Ivri (1998). All items, except the utilization level items, were measured using a seven point Likert-type scale, ranging from 'strongly disagree' (i.e., 1) to 'strongly agree' (i.e., 7). The utilization of the IS (e-learning tool) was measured using a seven point Likert-type scale ranging from 'never in use' (i.e., 1) to 'actively in use' (i.e., 7).

Three university colleges, having recently implemented an e-learning tool accessible to all faculty members, agreed to participate in the study. The implementation was initiated by the management at all three institutions, with the purpose to support teaching activities. The faculty was offered basic training, and a super user function was also established. The usage of the system at all three institutions was in the "final test-phase" at the time of the study and the utilization of the system was voluntary.

An early version of the questionnaire was presented to 10 prospective respondents. They were asked about their own and their co-workers present utilization of the IS. Subsequently they filled in a close-to-final version of the questionnaire without the researchers being present. The test group was, at this stage, encouraged to write comments if items were found to be ambiguous or not-understandable. Improvements were made at each of these steps, particularly with a view to contextual adjustments in original item wording. Specifically, the instruments on satisfaction and usefulness were prepared thoroughly to fit the e-learning and teaching context. The satisfaction instrument was changed from a semantic differential scale to a Likert-type scale as a result of feedback from pre-test respondents. Wording in the usefulness items was changed from e.g., "...productivity in managing personal finances" and "...effectiveness in managing personal finances" to e.g., "...improves my teaching quality" and "...makes it easier to do my job as a teacher". Data and respondents participating in the refining of the instruments were not included in the final sample. The final instruments are shown in Table 1.

Since our main concern was IS continuance intention and task-technology fit, only faculty members who had taken advantage of the IS for ordinary, on-site courses were asked to respond. Use of the e-learning system was voluntary, however, respondents were instructed to respond only if they felt that they could, at their own discretion, decide to discontinue their use of the IS for the subsequent semester. The data collection period was 14 days, and 135 usable questionnaires of the 410 sent out were received by the end of March 2003, which gives a response rate of 33%. The reasons why the response rate was somewhat low, may be that not all the faculty members had made an effort to use the IS in ordinary, on-site courses, and that some of the faculty members worked within "distance" teaching only.

Thirty-two percent of the respondents were women and 68% were men. The average respondent was 45 years old (1% below 30, 23% in the 30s, 51% between 40 and 54, and 25% above 55), held a Master's degree, and had 15 years of experience in using computers. Both the gender and age distribution reflect the true distribution at the three university colleges, which indicates a representative sample.

## 5. Data analysis

We employed Partial Least Squares (PLS), a second generation regression method that combines confirmatory factor analysis with linear regression, as our analysis approach and utilized the tool PLS-Graph (version 3.00).

### 5.1. Measurement model results

With a view to evaluating the measuring instruments, it is important to consider whether the indicators can be characterized as reflective or formative in nature (Bollen & Lennox, 1991). Jarvis, MacKenzie, and Podsakoff (2003) note that constructs in a model should be modeled as reflective if the following decision rules hold: – the direction of causality is from constructs to indicators; and, the theoretical framework of indicators does not differ. The construct should be modeled as formative if the opposite conditions apply. For perceived task-technology fit, confirmation, perceived usefulness, satisfaction and IS continuance intention, the decision rules suggest latent constructs with reflective indicators. The variable utilization should be modeled as a composite latent construct with formative indicators.

Modeling utilization as a formative construct means that each individual indicator determines the latent variable; i.e., the degree of utilization of each individual function provided in the IS determines the total utilization level. Extensive use of one specific function (e.g., the electronic mail function) does not necessarily result in extensive or constricted use of other functions (e.g., the discussion forum function). Because of this, we cannot expect a correlation between these indicators. It follows that our utilization level instrument cannot be tested for internal consistency and reliability (Bollen & Lennox, 1991).

However, the literature suggests that formative constructs can be investigated for validity by evaluating two different conditions. First, psychometricians argue that formative constructs require a census of all the indicators that form the entire construct (Jarvis et al., 2003). Second, Bollen and Lennox state: "...to assess validity we need to examine other variables that are effects of the latent construct." (1991, p. 312). Adhering to these conditions means paying attention to (1) a census of the included items and (2) criterion-related validity (Jarvis et al., 2003). The criterion of census was addressed in questionnaire pre-test procedures. The participants were invited to evaluate the eight items in the proposed instrument and asked to suggest other relevant functions provided in the IS. It turned out that the eight items in our instrument covered all the functionalities that would be used in on-site courses. Criterion-related validity is addressed in the PLS analysis when testing the explanatory power of the variable of users' utilization of the IS within the expectation–confirmation model of IS continuance.

The adequacy of the five reflective variables (i.e., perceived task-technology fit, perceived usefulness, confirmation, satisfaction and IS continuance intentions) can be determined by looking at: (1) individual item reliabilities; (2) the convergent validities of measures associated with individual variables; and (3) discriminant validity between variables and items (Hulland, 1999). We also chose to show the same adequacy criteria for the formative instrument utilization even though these, as stressed above, are not necessary requirements for formative variables (Jarvis et al., 2003).

Table 1 shows items, means, standard deviations and loadings for the five constructs in the extended model. For each construct, the assessment of convergent validity or internal consistency is also included (Fornell & Larcker, 1981). All the items, except two, have loadings close to 0.7 or above. Item two in the perceived task-technology fit instrument and item two in the IS continuance intention instrument were both deleted due to item reliability below the recommended threshold of 0.70 (i.e.,  $0.70^2 = 0.49$ ). The calculated value for internal consistency at a construct level should exceed 0.70 (Nunnally, 1978). The criterion is met for all five reflective constructs.

The discriminant validity of items and variables were examined using factor and correlation analyses. As we can see from the factor analysis in Table 2, all items, except item number three in the sat-

**Table 2**  
Item to latent variable correlations. (i.e. bold numbers) and cross loadings between variables (i.e. plain numbers).

	Usefuln <sup>a</sup>	Task-tech	Utilization	Confirm	Satisfac	Continuan
Ufuln1	<b>0.85</b>	0.59	0.45	0.37	0.35	0.40
Ufuln2	<b>0.79</b>	0.52	0.44	0.27	0.30	0.46
Ufuln3	<b>0.84</b>	0.56	0.50	0.33	0.30	0.42
Ufuln4	<b>0.73</b>	0.40	0.33	0.38	0.31	0.21
Ufuln5	<b>0.83</b>	0.65	0.48	0.37	0.34	0.40
TasTec1	0.63	<b>0.92</b>	0.54	0.23	0.15	0.45
TasTec3	0.68	<b>0.93</b>	0.58	0.25	0.17	0.46
Utiliz1	0.46	0.47	<b>0.77</b>	0.13	0.11	0.53
Utiliz2	0.36	0.37	<b>0.67</b>	0.13	0.18	0.48
Utiliz3	0.50	0.53	<b>0.87</b>	0.16	0.12	0.61
Utiliz4	0.35	0.33	<b>0.45</b>	0.22	0.21	0.21
Utiliz5	0.33	0.34	<b>0.63</b>	0.19	0.24	0.43
Utiliz6	0.21	0.27	<b>0.53</b>	0.15	0.20	0.38
Utiliz7	0.20	0.32	<b>0.41</b>	0.22	0.16	0.24
Utiliz8	0.15	0.23	<b>0.27</b>	0.12	0.03	0.13
Conf1	0.54	0.47	0.43	<b>0.91</b>	0.70	0.47
Conf2	0.50	0.43	0.31	<b>0.93</b>	0.71	0.39
Conf3	0.60	0.51	0.41	<b>0.90</b>	0.75	0.46
Satisf1	0.60	0.53	0.49	0.62	<b>0.94</b>	0.72
Satisf2	0.51	0.41	0.34	0.66	<b>0.91</b>	0.65
Satisf3	0.42	0.37	0.17	0.66	<b>0.69</b>	0.18
Continu1	0.45	0.51	0.68	0.25	0.22	<b>0.88</b>
Continu2	0.33	0.22	0.39	0.15	0.31	<b>0.76</b>
Continu3	0.48	0.47	0.57	0.15	0.22	<b>0.80</b>

<sup>a</sup> Usefuln, perceived usefulness; Task-tech, perceived task-technology fit; Confirm, confirmation; Satisfac, satisfaction; Continuan, IS continuance intention.

isfaction instrument, had cross loading coefficients that are at least 0.10 lower than the factor loading on their respective assigned latent variables (cf. Gefen & Straub, 2005). We therefore decided to delete item three in the satisfaction instrument due to an unacceptable high cross loading with the confirmation instrument before examining the discriminant validity at the variable level.

The inspection of discriminant validity among variables is based on the squared correlations between variables and their extracted respective average variance (Fornell & Larcker, 1981). For the correlation analysis shown in Table 3, the extracted average variance value for the reflective variables is consistently greater than the off-diagonal squared correlations, suggesting satisfactory discriminant validity among variables.

## 5.2. Structural model results

Fig. 1 summarizes the structural model results. Standardized regression coefficients are shown above each path with appurtenant *t*-values in brackets.  $R^2$  is shown in conjunction with each endogenous latent construct.

Six out of nine path coefficients show positive associations with dependent variables. We conclude that Hypotheses 1, 3, 4, 5, 6 and 9 are supported. The structural model analysis documents acceptable levels of explained variance for IS continuance intentions (i.e., 68%), utilization (i.e., 37%), satisfaction (i.e., 58%) and perceived usefulness (i.e., 58%).

**Table 3**  
Squared correlations among variables (i.e. plain numbers) and average variance extracted (i.e. bold numbers).

Construct	1	2	3	4	5	6
1. Perceived task-technology fit	<b>0.86</b>					
2. Utilization	0.37	<b>0.36</b>				
3. Perceived usefulness	0.51	0.34	<b>0.67</b>			
4. Confirmation	0.26	0.18	0.36	<b>0.84</b>		
5. Satisfaction	0.24	0.20	0.33	0.54	<b>0.90</b>	
6. IS continuance Intention	0.24	0.45	0.26	0.23	0.52	<b>0.66</b>

## 6. Discussion and implications

We found support for three out of four added hypotheses in our 'extended post-acceptance model'. The obtained results suggest that the variables from the task-technology fit theory are important in explaining users' continuance intention. Both perceived task-technology fit and utilization explain what they were hypothesized to do, and thus, this also indicates adequate criterion-related validity for the formative construct utilization. Indeed, the two added variables together with prior variables from the post-acceptance model explain as much as 68% of the variance in IS continuance intention. We believe that this is very close to the inherent ability in the analysis of path models to explain variance in a dependent variable. The main theoretical implication of the present study is that an extension of a model that is composed of IT-centric constructs with a set of more work system-centric constructs (cf. Alter, 2003) has merit.

Goodhue and Thompson's (1995) theory of task-technology fit states that for an IS to have positive impact, it must be utilized and be a good fit for the tasks it supports. Our version of Goodhue and Thompson's proposition is that for users to continue to use an IS, it must be utilized and be a good fit for the tasks it supports. The results from this study support the latter of these propositions. More specifically, we have demonstrated that users, who perceive the actual IS to coincide with the needs of getting their work done, utilize more functionality in the available technology. Moreover, when they utilize a broad range of the IS-functionality, they also develop a strong intention toward continued use. In contrast to this work system-centric explanation of IS continuance intentions, comes the explanation based on the users' satisfaction with the IS. We found that this satisfaction was formed by the degree of confirmation based on a set of initial expectations to the system, and that the users' satisfaction with the IS stimulates the development of strong intention about IS continuance. This result, which is more IT-centric in nature, demonstrates that confirmation of the users' beforehand expectations is critical for attaining satisfied users at a later stage. To summarize, it seems that the present findings support two different and independent paths that both explain IS continuance intention. The work system-centric route looks like this: *task-technology fit* → *utilization* → *IS continuance intention*; and the IT-centric route goes like this: *confirmation* → *satisfaction* → *IS continuance intention*. Both routes have relatively strong support through their respective and approximately equal path coefficients. In addition, they represent different explanations for IS continuance intentions, due to the lack of correlation between utilization and satisfaction.

The lack of a significant relationship between utilization and satisfaction is contradictory to previous research reports (DeLone & McLean, 2003). Could it be that the explanation for the insignificant relationship between satisfaction (attitude) and utilization (behavior) is due to how utilization is measured in the present study? Utilization, as it is operationalized here, deals with both the extent of functions taken into use and the frequency of use. It may be that the users' satisfaction with the actual IS develops independently of extent and frequency of use. This is, however, not the same as saying that satisfaction is not based on the use of a system. We only suggest that it may be that satisfaction is based on a general usage experience. This would suggest that overall attitude forms separately and is not related to the extent of functions taken into use and frequency of use. Thus satisfaction may be independent of how much users utilize a technology, it is not unreasonable to assume that satisfied or unsatisfied users exist at every utilization level. This *post hoc* explanation could be a basis for future research.

We also found that among the three exogenous variables, perceived usefulness seemed to have no impact on the dependent variables. Of course, the divergence between documented prior positive impact (e.g., Bhattacharjee, 2001; Limayem, Hirt, & Cheung, 2007) and the present missing influence of perceived usefulness, may be a result of the characteristics of the IS underlying the data obtained.

## 7. Implications for IS practitioners

In this study, we have demonstrated the importance of ‘task-technology fit’ in explaining IS continuance intentions. In related published reports, the message to practitioners has mainly been to focus on IT-centric variables with, e.g., user satisfaction and perceived usefulness as the key to success (success meaning “strong intention among users to continue their use of an IS”) (Chiu, Sun, Sun, & Ju, 2006; Premkumar & Bhattacharjee, 2006; Roca et al., 2006; Thong et al., 2006). Results obtained in this study suggest that work-centric variables as perceived task-technology fit and the users’ utilization of IS functions can be just as important in determining intention to continue using an IS. Therefore, IS practitioners should not only focus on user satisfaction and perceived usefulness, but also take the users’ perceived task-technology fit and their utilization of IS functions into consideration when planning initiatives where the purpose is to motivate the users for continued use of an IS.

An example of a concrete initiative with the purpose of extending the users’ utilization of IS functions might be to let users or user representatives participate in the process of selecting core IS-functionality. As a following consequence, the attention to job-relevant IS aspects could become more directional. An additional suggestion is that IS training should have increased focus regarding how functions can be utilized in a job context (rather than focus on the IS in its own right).

The present study also illustrates the complexity in ensuring the continued use of an IS. According to our results, four out of five antecedents in our model play a role in forming users’ IS continuance intentions. In their interaction with users, practitioners should therefore: (a) be sensitive for the users’ IS performance expectations; (b) choose an IS that users perceive to be in conformance with their job tasks (e.g., through user participation); (c) encourage a comprehensive level of utilization of the IS’s functions (e.g., through work task relevant computer training); and (d) simultaneously stimulate positive feelings toward the IS.

## 8. Limitations

The present research has limitations. First, we measured IS continuance intention but not actual IS continuance level the following semester. Second, the use of cross-sectional survey data has limitations. Finally, given the relatively low response rate, the results may be influenced by a non-response bias.

## 9. Further research

Further research is essential to increase our contextual understanding of the ‘extended post-acceptance model’. As an example, it may be interesting to investigate if some underlying pedagogical assumptions define the tasks that lecturers perform, and further, how these may influence how lecturers choose to utilize e-learning in the long run. This may also be relevant to our understanding of how expectations are established among lecturers. Are lecturers’ pre-acceptance expectations to e-learning, based on underlying pedagogical assumptions? Will these assumptions determine the

level of confirmation in the first instance, and will they determine the level of satisfaction in the second instance?

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