Understanding e-learning continuance intention: An extension of the Expectation-Confirmation Model

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Abstract

This paper aims to develop an integrated model designed to predict and explain an individual's continued use of e-learning services. Multiple theoretical models are synthesized to hypothesize a model of e-learners' continuance behavior, which integrates the expectation confirmation model (ECM), technology acceptance model (TAM) and theory planned behavior (TPB) model. The proposed model was empirically evaluated using survey data collected from 381 users about their perceptions of e-learning. Salient results include: (1) consumers' continuance intention is determined by their satisfaction, subject norm, perceived behavior control, satisfaction and perceived usefulness, and (2) the satisfaction of e-learning is influenced by confirmation and perceived usefulness, and perceived ease of use. Implications of these findings for e-learning are discussed.
Keywords: Expectation-confirmation model, Theory of planning behavior (TPB), Technology acceptance model

1. Introduction

E-learning refers to learning delivered through a Web browser over the Internet. With the rapid advances in Internet/Web technology, the social demands for improved access to higher education have facilitated the rapid growth of online learning or electronic learning (e-learning) [1]. According to International Data Corporation (IDC), the international e-learning market is growing by leaps and bounds. IDC estimated the international e-learning market growing from US$6.6 billion in 2002 to US$30.2 billion in 2007, at a compound annual rate of 35.6%. Seventy percent of universities in the USA are now providing e-learning courses, according to research of Market Data Retrieval. These developments reflect the significance of e-learning among scholars and practitioners. Although several research projects have focused on the factors that impact on the adoption of information technology (IT) or Internet over the past decade, there is limited empirical work for investigating the motivations behind learners' intention to continue using e-learning. While initial acceptance of e-learning is an important first step toward realizing e-learning success, long-term viability of an e-learning and its eventual success depend on its continued use rather than first-time use. This is because infrequent and ineffective usage of the e-learning system after the initial adoption may incur learning failures or result in a waste of effort to develop the e-learning system.

In order to provide a solid theoretical basis for examining the adoption of e-learning services, this paper first draw on two schools of though based on innovation diffusion theory [2]: (1) the technology acceptance model (TAM) [3], and (2) the theory of planned behavior(TPB) [4]. Despite the fact that these studies have examined variables that motivated individuals to accept a new IT, and how they do it, neither TAM nor TPB have been found to provide consistently superior explanations or behavioral predictions [5]. Recently, a growing body of research has focused on integrating them to examine information technology (IT) usage and e-service adoption because these two models are complementary, and the results have showed that the integration model had better exploratory power than the individual use of TAM and TPB. Since the focus of this study is e-learning service adoption, which is an instance of acceptance of innovative technology intertwined with social systems and personal characteristics, the integration of TAM and TPB for our research framework should be in a complementary manner to better understand the learners' intention towards, and acceptance of, e-learning. Like any We-based application, the success of e-learning depends largely on user satisfaction and other factors that will eventually increase users' intention to continue using it (continuance intention). Expectation Confirmation Model(ECM)--- a relatively new theoretical model by Bhattacherjee [6] that was developed

specially to understand users' continued IT usage behavior. Recently it has been widely applied to predict e-commerce service continuance behavior [7, 8]. Naturally, the integration of ECM with TAM and TPB for our research framework should provide a more comprehensive model to examine the users' continuance intention of e-learning.

In this study, Structural Equation Modeling (SEM) to verify this study the theoretical model, and the light of the study tested the hypothesis. The paper proceeds as follows. The next section describes E-learning behavioral intention of continuing relevant theory with the theoretical sides of the argument. The third and fourth section describes the research methodology used to empirically test the research model. The fifth section presents the results of data analysis. The sixth and seventh section discusses research implications for the study's key findings and its limitations. The final section summarizes the study's core findings and its contributions.

2. Theoretical background

2.1. Expectation-confirmation model (ECM)

In the IT literature, Bhattacherjee [6] proposed an ECM of IT continuance based on the congruence between individuals' continued IT usage decisions and consumers' repeat purchase decisions. The ECM posits that an individual's intention to continue IT usage is dependent on three variables: the user's level of satisfaction with the IT; the extent of user's confirmation of expectations; and post-adoption expectations, in the form of perceived usefulness.

Applying the ECM framework to the study of users' behaviors in an e-learning context is appropriate[9, 10] because users' behavior affects their repeat use decision; however, some theoretical extensions may be required to explain users' continuance behavior in using an e-learning system. Therefore, the model here focused only on post-acceptance variables, since the ex-post expectations are especially important for e-learning system, because users' expectations may change over time. If an e-learning system targets users and heightens their loyalty to the site, it is necessary to understand the users' continuance behavior[8]. Hence, this study ECM to study when the basic model.

2.2. The technology acceptance model (TAM)

TAM adapted from TRA proposes that two particular beliefs, perceived usefulness and perceived ease of use, are the primary drivers for technology acceptance. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his/ her job performance", and perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of physical and mental effort" [11]. Further, perceived usefulness and perceived ease of use both affect a person's attitude toward using the system, and consistent with TRA, these attitudes toward using the system determine behavioral intentions, which in turn lead to actual system use. The causal relationships have been validated empirically in many studies of user acceptance. TAM has been extended by the addition of other constructs such as computer self-efficacy, Internet self-efficacy, subjective norm or perceived enjoyment[12].

2.3. Theory of planned behavior (TPB)

The theory of planned behavior (TPB) is an extension of the theory of reasoned action (TRA)[13, 14], which has as its main goals the prediction and understanding of human behavior. It postulates that individuals' behavioral intentions are determinants of their actual behavior. Behavioral intention in TPB is a function of three determinants: attitude, subjective norm, and perceived behavioral control[5].

Attitude (A) refers to "the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question" [13]. Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" [4]. In other words, subjective norm is related to the normative beliefs about the expectation from other people. Perceived behavioral control refers to "people's perception of ease or difficulty in performing the behavior of interest".

3. Research model and hypothesis

3.1 Research model

Fig. 1 illustrates the research model, which was built based on ECM with TAM and TPB. It asserts thet e-learning continuance intention is determined by satisfaction, social norms, perceived behavior control and perceived usefulness. Satisfaction is determined by perceived usefulness, perceived ease of use, perceived enjoyment and perceived value. Furthermore, confirmation mediated the impact of interaction on perceived usefulness, perceived enjoyment and satisfaction. The following section elaborates on these relationships and the

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theoretical underpinning of these hypotheses.

3.2. Hypotheses development

3.2.1. Expectation confirmation model

There are five main hypotheses in the ECM. We derived the following hypotheses from the ECM:

H1. Users' satisfaction with e-learning is positively related to their continued intention.

H2. Users' confirmation of expectations is positively related to their satisfaction with e-learning.

H3. Users' perceived usefulness of e-learning is positively related to their satisfaction with e-learning.

H4. Users' perceived usefulness of e-learning is positively related to their continued intention.

H5. Users' confirmation of expectations is positively related to their perceived usefulness of e-learning.

3.2.2. Incorporating TAM into ECM

In TAM model, perceived ease of use is expected to have a direct effect perceived usefulness on IT usage intention (ex:[3, 11]). After research according to this research direction and theories in IS focus on the behavioral aspects of human decision-making processes and individual level reactions to using technologies in organizations and other research. Therefore, we according to this research arrive at the following hypothesis:

H6. Users' perceived ease of use of e-learning is positively related to their perceived usefulness of e-learning.

H7. Users' perceived ease of use of e-learning is positively related to their satisfaction of e-learning.

3.2.4. Synthesis of ECM and TPB

The relationship between ECM and TPB can be examined from the perspectives of attitude, subjective norm, and perceived behavior control. While some researchers consider satisfaction to be synonymous with attitude[7, 15]. For synthesizing the concepts of TPB into EDM, the theoretical construct of attitude should be utilized instead of satisfaction [7].

Hence, we arrive at the following hypotheses:

H8. Subject norm will positively affect

continued intention.

H9. Perceived behavior control will positively affect continued intention.

4. Research method

This section discusses our research method and design. Section 4.1 described the research subject and data collection method. Then, we described the instrument measurement and data analysis method dentally in section 4.2 and 4.3.

4.1 Data collection

Empirical data were collected by conducting a field survey of E-learning users. Subjects were self-selected by placing messages on online message boards on popular E-learning web sites and campus BBS in Taiwan. The message stated the purpose of this study, provided a hyperlink to the survey form, and, as an incentive, offered respondents an opportunity to participate in a draw for several volume books ceremony. This online survey which yielded 381 usable responses was conducted for one month (2007/3/19 - 2007/4/19). Seventy-eight percent of the respondents 59.31% were male and 40.69% were female. The majority of respondents (52.3%) were under 25 years old. A bout 70.5% of the respondents had university qualifications and had 3 years of experience in using the WWW to browse information. Occupational, 63.16% of the respondents are students. From the above information can know that the study targets have better education, and accounted for the majority of students.

4.2 Measurement

The questionnaires were developed from the literature. The scale items for continuance intention, satisfaction, confirmation, perceived usefulness, perceived ease of use, and perceived playfulness were developed from the study of Juan [12]and James [16]. The scale items for subjective norm and perceived behavioral control were developed from the study of Chechen Liao [7]. Furthermore, items for subjective norm and Perceived behavioral control were adapted from prior work by Chiu [17]. Each item was measured on a seven-point Likert scale, ranging from "disagree strongly" (1) to "agree strongly" (7).

4.3 Data analysis

This study was conducted using SPSS10.0 and AMOS 5.0 as analysis tool. The data analysis method involved descriptive statistic,

correlation analysis, confirmatory factor analysis and Structural Equation Model. The proposed model was tested using the SEM; SEM is a powerful second-generation multivariate technique that combines multiple regressions. SEM was used to analyze causal models and estimate simultaneously a series of interrelated dependence relationships with confirmatory factor analysis. The test of the proposed model includes an estimation of two components of a casual model: the measurement and the structural models.

5. Results

This study used the (Structural Equation Model, SEM) approach that used AMOS 5.0 as a data analysis tool. First, we examine the measurement model to measure convergent and discriminant validity. Then, we examine the structural model to investigate the strength and direction of the relationship among the theoretical constructs.

Convergent validity indicates the extent to which the items of a scale that are theoretically related should correlate highly. In measurement model, if the composite reliability is higher than the item of a scale will correlate highly. Fornell [18] suggests that composite reliability should exceed the acceptable value of 0.7. The average variance extracted refers to the degree of all variables variance which could explain degree by latent variable. The average variance extracted for all constructs exceed the threshold value of 0.5 recommended by Fornell and Larcker [19]. Table 1 shows that all the measures fulfill the recommended levels, with the composite reliability ranges from 0.76 to 0.90 and average variance ranges from 0.55 to 0.75. Since the composite reliability and average variance extracted were above the recommend values, the scales of measuring these constructs were deemed to exhibit satisfactory convergent reliability. Discriminant validity was assessed using a series of χ^2 difference tests by constraining the correlation parameters between factors to 1.0. Each time only one correlation parameter was fixed. A significant χ^2 difference between the constrained and unconstrained CFA model indicated discriminant validity between the constrained pair of constructs.

The fitness measure was recommended by Hairs et al. [19]. For model with good fit, the ratio of chi-square to the degree of freedom (χ^2 / df) should be less than 3.0 Hayduk [20], GFI and CFI should exceed 0.9 Bagozzi and Yi

[21], AGFI should exceed 0.8 Scott.[22], and RMSEA should be less than 0.08. Bagozzi and Yi [21]. As shown in table 5, the value of χ^2 / df, AGFI, CFI and RMSEA all met the criteria, except for GFI which lower than commonly cited threshold. But as Doll et al.[23] argued, GFI ranging from 0.8 to 0.9 could be interpreted as reasonable fit, although score of 0.9 or higher is considered evidence of good fit. In sum, the overall results suggested that the research model provided an adequate fit to the data. The structured equation model (SEM) was used to test the 9 hypotheses proposed in this study. The hypothetical model (see Fig. 2) was depicted using visual tools provided by AMOS. Each indicator was connected to its theoretical construct in a reflective manner as well as linked accordingly to the hypothesis. Exogenous constructs including perceived Web quality, perceived value and perceived enjoyment were freely correlated. Our hypotheses result as shown in Fig. 2.

6. Discussion

This study attempts to harmonize the essence of ECM with TAM and TPB to propose an integrated model for explaining users' e-learning continuance intention. We have also examined the effects of perceived usefulness, perceived ease of use, and confirmation on satisfaction, and the effects of subjective norm, perceived behavioral control, perceived usefulness and satisfaction on e-learning continuance intention.

The structural model provided a good fit to the data, and most path coefficients in the research model were found some interesting. First, the present study was able to explain a significant amount of variance in e-learning satisfaction (82%) and continuance intention (50%). The results suggest that the research model provided good explanatory power of user satisfaction. It implies that factors of the extended ECM play important roles in shaping user satisfaction, and thus IS researchers should consider post-usage factors when exploring users' satisfaction with the specific technology[17].

Second, subjective norm and perceived behavioral control are identified as two significant motivators of behavioral intention towards continuous use of e-learning system. With subjective norm and perceived behavioral control, the total variance explained in behavioral intention increases from 41% (in Bhattacherjee [6]) to 50%. This reveals that synthesizing the theoretical constructs of TPB

with ECM can definitely increase the accuracy of an integrated model to predict and explain users' behavioral intentions.

Thirdly, perceived usefulness should have a direct effect on behavioral intention since a user believes that continuing use of e-learning system will increase their learning performance. Fourth, a user's satisfaction is mainly determined by confirmation. Moreover, confirmation and perceived usefulness can jointly explain 82% of error variance in satisfaction.

7. Conclusions

This study has devoted much effort on developing an integrated model to predict and explain an individual's continued use of e-learning system on the concepts of the ECM with TAM and TPB. The measurement model indicates the theoretical constructs have adequate reliability and validity, while the structured equation model is testified to having a high model fit for the empirical data. Study's findings show that a user's behavioral intention towards e-learning system continuance is mainly determined by user satisfaction and additionally affected by perceived usefulness, subjective norm and perceived behavior control. Generally speaking, the integrated model can fully reflect the spirit of ECM and take advantage of TPB and TAM. Upon considering the impact of systemic features, personal characteristics, and social influence on user behavior, the integrated model had a better explanatory power than other ECM proposed in prior research.

The findings of the present study have various implications for research as well as practice. First, confirmation was a significant mediator of the effects that perceived usefulness had on satisfaction. Second, perceived usefulness and confirmation were found to be significant direct antecedents of satisfaction. Third, subjective norm and perceived behavioral control are verified as having a significant influence on behavioral intention. Thus, advertisement, propaganda, and periodic review should be applicable tactics for encouraging continued use of e-learning system.

Finally, satisfied users form intentions to use the system in the future. Therefore, in an e-learning context users are more concerned about how an e-learning system provides information and how it will make them more productive in their tasks.

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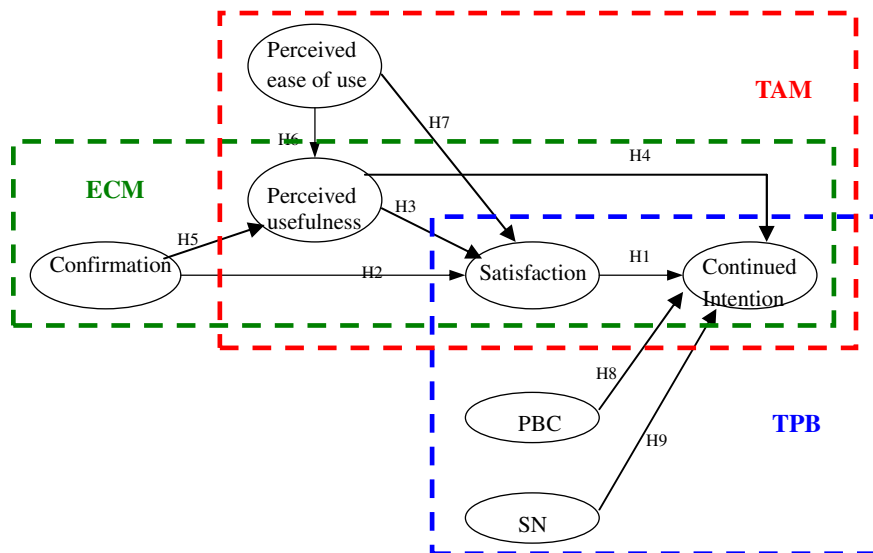
Figure 1: The research model

Table 1 Construct reliabilities

Construct	Factor loading	C.R.(T-value)	Composite realiability(CR)	Average variance extracted(AVE)
Perceived usefulness	0.835	18.673	0.8395	0.6374
	0.858	19.392		
	0.692	14.525		
Perceived ease of use	0.789	10.890	0.7835	0.6442
	0.816	11.069		
	0.742	15.367		
Subjective norm	0.673	12.199	0.7606	0.6181
	0.885	15.313		
Perceived behavioral control	0.749	15.598	0.8018	0.5742
	0.774	16.339		
	0.750	15.649		
Confirmation	0.869	20.916	0.9030	0.7564
	0.878	21.256		

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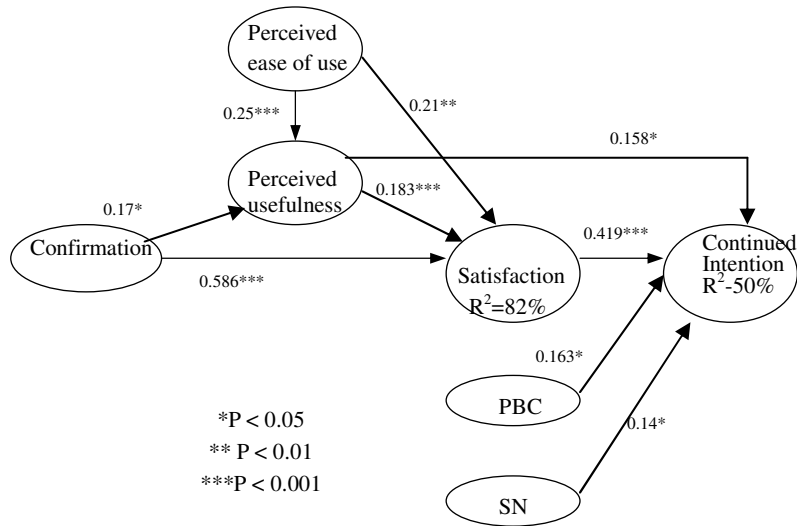|				
Satisfaction	0.862	20.646	0.8896	0.7291
	0.867	20.852		
	0.892	21.844		
Continuance Intention	0.800	18.409	0.8013	0.5736
	0.733	15.200		
	0.789	16.704		
	0.749	15.607		

Figure 2: The research model