Exploring Users' Satisfaction and Continuance Intention towards E-Learning Systems

Ling-Lang Tang †
College of Management
Yuan Ze University, Taipei, Taiwan, R.O.C.
Tel: (+886) 3-463-8800, Email:balltang@saturn.yzu.edu.tw

Kiet Oanh Chau
College of Management
Yuan Ze University, Taipei, Taiwan, R.O.C.
Tel: (+886) 3-463-8800, Email: oanhchau1987@gmail.com

Abstract. With its beneficial features such as cost-efficiency, self-management of learning, on-demand training, anywhere and anytime availability, e-learning has been applied widely in education. Based on TAM, D&M model and ISCM model, this study seeks to develop a more comprehensive framework to explain about user satisfaction and continuance intention to use e-learning system. There are totally eight constructs which are perceived support, self-efficacy, anxiety, perceived quality, perceived usefulness, perceived ease of use, user satisfaction, and continuance intention. Based on the responses of 268 students, structural equation modeling was used to conduct data analysis. Different from TAM model, our framework focuses on the e-learners' post adoption instead of initial acceptance. Our research findings indicate that there are more factors influencing on the success of e-learning systems rather than IS-related constructs proposed in D&M IS success model. Besides, our study proves that perceived usefulness is not the mere determinant of user satisfaction. Some variables investigated in this study are rarely empirically explored before. This study shows the direct influence of perceived ease of use on users' continuance intention to use. In practice, our research findings provide with more references to enhance e-learning system usage in educational section and suggestions for future research direction.

Keywords: e-learning, user satisfaction, continuance intention, perceived quality

1. INTRODUCTION

E-learning refers to a wide set of applications and processes such as web-based learning, computer-based learning, virtual class-room, and digital collaboration. In 2013, e-learning is estimated to be a $ 56.2 Billion business and is likely to be double by 2015. From the viewpoint of consumer, voluntary learners can be considered as customer in e-learning settings with their demands for both quality and satisfaction. With the increasing competition in e-learning markets and the more sophistication of customer demands, e-learning success has become urgent issue.

In this context, Technology Acceptance Model (TAM) has been the most widely used to study the acceptance of e-learning. However, acceptance isn't equivalent to success, especially in educational section (Nistor & Neubauer, 2010). Hence, the success of e-learning must depend on both acceptance and its continued usage (Chiu, Sun, Sun, & Ju, 2007). DeLone and McLean (1992) suggested that user satisfaction is probably the most important factor of information system success. And this suggestion is also suitable in the settings when e-learning is mandated (Brown *et al.*, 2002). Research findings also show that satisfaction will lead to positive word of mouth, repurchase and loyalty.

Various theoretical models have been proposed to offer the new insights into user satisfaction and continuance intention (Bhattacherjee, 2001; Chiu, Hsu, Sun, Lin & Sun, 2005; Chiu *et al.*, 2007; Liao, Chen, & Yen, 2007; Lin, Chen & Fang, 2011). Among these models, the most widely used one is Expectancy Confirmation theory (ECT) and D&M model (DeLone & McLean, 2003). However, some research reported that the conceptualization of expectation in many ECT studies lacks of consistency. To remedy this problem, Bhattacherjee (2001) proposed Information System Continuance Model (ISCM) based on ECT, which mainly focus on post adoption expectations rather than pre-adoption. Besides, it is found that hardly did prior researches mention the aspects of supports from Instructor and University, which are believed to be of the important motivators to e-learning system usage.

Therefore, the objectives of this research are to propose a more comprehensive model to predict user satisfaction and continuance intention in e-learning basing on three models of TAM, D&M model and ISCM with additional sets of environmental and attitude constructs,. Hopefully, the proposed model will fill the mentioned research gap.

2. LITERATURE REVIEW AND HYPOTHESES

2.1 Research Model Development

In this paper, we argue that TAM proposes a model with "perceived usefulness and perceived ease of use" as mediators to explain how users accept a new information system. However, it fails to mention how IS providers can maintain users' usage in the future. Whereas, D&M model indicates satisfaction and "use/ intention to use" are two important measures for IS success. In this model, IS quality constructs are posited as the mere predictor. But according to many research findings, there are more external factors affecting success of an information system (Roca *et al.*, 2006; Wang & Wang, 2009; Cho *et al.*, 2009; Saba, 2012). Meanwhile, D&M model implied initial use and continuous use are different. "Use" must precede "user satisfaction" and greater "satisfaction" will affect reversely, which leads to "increased use" (DeLone & McLean, 2003). Hence, it is improper for this model to measure "initial use" and "increase use" with the same construct "use/ intention to use". On the other hand, ISCM is grounded on the reason that "initial adoption" of IS is different from "post adoption" and this model is more focused on "post adoption" behavior. It puts forward the hypotheses that satisfaction and perceived usefulness are two strongest predictors of IS continuance intention and perceived usefulness is one of the primary determinants of satisfaction. ISCM uses perceived usefulness as the post adoption expectation belief. But as per some researchers' arguments, users may form expectations about various dimensions such as system quality, support quality, result demonstrability (Hong *et al.*, 2006).

With above arguments, we integrate TAM, D&M model and ISCM to develop a new model for predicting user satisfaction and continuance using intention in e-learning. Besides, considering e-learning context, we put two additional sets of constructs: attitudes (self efficacy and anxiety) and perceived support in the new model. Hence, there are eight constructs in our framework including perceived quality, perceived support, perceived usefulness, perceived ease of use, self efficacy, anxiety, satisfaction and continuance intention.

2.2 Proposed Hypotheses

2.2.1 Perceived quality

In IS domain, perceived quality includes three dimensions: system quality, information quality, and service quality. These three dimensions are indicated to have different impact on IS system. According to DeLone & McLean (2002), information quality and system quality can be the most important components to measure the success of a single system while service quality can be a more important variable for measuring overall success of IS department. DeLone and McLean (1992) also found that system quality and information quality have a direct influence on user satisfaction and use. In e-learning context, this result has been empirically confirmed by many researches (Liaw, 2008; Roca *et al.*, 2006; Wang and Chiu, 2011). Regarding to service quality, in IS researches, there are different findings relating to its impact on user satisfaction. Negash *et al.* (2003) showed service quality has no impact on satisfaction; in contrast, Lai (2004) proved that service quality is an antecedent of satisfaction in a short-message service. However, e-learning literature confirms service quality's significant impact on user satisfaction. Thus, we hypothesize:

H1: *Perceived quality has a positive effect on satisfaction of the e-learning system.*

2.2.2 Perceived usefulness and Ease of Use

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his/ her performance" and perceived ease of use is "the degree to which a person believes that using a particular system would be free of physical and mental efforts" (Davis, 1989). As mentioned above, perceived usefulness and perceived ease of use are two important beliefs in TAM. Regarding to the impact of these two beliefs on satisfaction, in ISCM model, perceived usefulness is confirmed to be a significant determinant of user satisfaction. Besides, this finding has also been supported by other researchers (Hayashi *et al.*, 2004; Seddon, 1997; Devaraj *et al.*, 2002; Roca *et al.*, 2006). Despite the mediating effect of perceived ease of use in technology acceptance stage, Bhattacherjee (2001) indicated that perceived ease of use have no impact in the IS post-adoption stage. Therefore, it was believed not to influence on user satisfaction. Nevertheless, the later research findings show different results. Rai *et al.* (2002) empirically assessed the Seddon IS success model (Seddon, 1997) and specified user satisfaction is impacted by perceived ease of use and perceived usefulness. Devaraj *et al.* (2002) proved that perceived ease of use is one of the significant antecedents of consumer satisfaction. Roca *et al.* (2006) confirmed perceived ease of use's effect on user satisfaction in e-learning system. Hence, the following hypotheses are proposed:

H2: *Perceived usefulness has a positive effect on satisfaction of the e-learning system.*

H3: *Perceived ease of use has a positive effect on satisfaction of the e-learning system.*

Additionally, these two beliefs are hypothesized to influence on continuance intention to use e-learning system. Although ISCM model consider perceived usefulness as the mere belief that will predict customer's continuance intention, TAM model posited that perceived ease of use and perceived usefulness of the technology are determinants to user acceptance. Therefore, perceived ease of use may also affect continuance intention. In addition,

some e-learning researches also support these arguments. Hayashi *et al.* (2004) found that to a large extent, among determinants of continuance intention to use e-learning system are perceived ease of use and perceived usefulness. Empirical studies in e-learning context indicated that continuance intention is predicted by perceived usefulness (Limayem and Cheung 2011). Therefore, we proposed that:

H4: Perceived usefulness has a positive effect on continuance intention to use e-learning system.

H5: Perceived ease of use has a positive effect on continuance intention to use e-learning system.

2.2.3 Perceived Support

In this study, perceived support is explored systematically with two dimensions which are instructor support and university support. Existing researches on users' motivation to use e-learning system mainly focus on examining e-learning system's attributes, learners' characteristics and instructor characteristics. However, there are few researches on the impact of support from these two parties, who are believed to be important stakeholders in e-learning context (Wagner *et al.*, 2008). Eom *et al.* (2006) indicated that the instructors' role is to stimulate, guide and challenge his/ her students, rather than delivery instructions as in face to face learning. Also, the instructors play an important role in encouraging their students. Moreover, given the importance of maintaining a strong visual community in e-learning contexts, the instructors have to motivate their students to participate in interactive discussion with other student (Peltier *et al.*, 2003). Consequently, the instructor is seen to have supportive role in e-learning environments. Besides, university or education institutional support assures the user that using e-learning system is part of the organization's culture and useful. Consequently, it encourages them to adopt and use e-learning system (Al-Busaidi, 2012). In addition, Selim *et al.* (2007) and Masrom *et al.* (2008) showed that support from university or educational institution is essential to the effectiveness of e-learning system.

Tracing back to the first TAM model (Davis, 1989), external factors was regarded to affect perceived ease of use and perceived usefulness while perceived supports can also be considered one of the external factors. Venkatesh *et al.* (2003) classified support as the facilitating conditions that affect intention. In the modified TAM model (Venkatesh & Bala, 2008) facilitating are believed to influence on intention to use through perceived ease of use and perceived usefulness. Consequently, the hypotheses are:

H6: Perceived support has positive influence on perceived usefulness.

H7: Perceived support has positive influences on perceived ease of use.

2.2.4 Self Efficacy and Anxiety

Individual characteristics have long been considered as critical factors which influence on information system success (Cho *et al.*, 2009; Sun *et al.*, 2008). In e-learning context, prior researches show that self-efficacy and anxiety are two critical factors in learner's dimension, which play vital roles to the activities of e-learning (Liaw, 2008; Sun *et al.*, 2008). Consequently, we put this two additional constructs to our research framework

There are different definitions of self-efficacy. According to Bandura (1986), self-efficacy is "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with the judgments of what one can do with whatever skills one possesses". Along with the time, some modifications have been made to this definition (Compeau and Higgins, 1995; Ajzen, 2002; Roca *et al.*, 2006; Sun *et al.*, 2008). Despite the variety of definition of self-efficacy, these definitions are basically similar. Therefore, in this study, self-efficacy is defined as the user's confidence and judgment to complete the e-learning courses.

In e-learning context, many previous studies explore the relationship between self-efficacy and user satisfaction. Some researches findings support the direct impact of self-efficacy on perceived satisfaction (Liaw, 2008). But recent empirical research findings indicate that self-efficacy doesn't influence directly on users' satisfaction (Saba, 2012; Sun *et al.*, 2008; Al-busaidi, 2012). Despite the conflicts in the research findings on the direct relationship between these two variables, the indirect effect of self-efficacy on user satisfaction in e-learning system cannot be ignored. In this study, we argue that the more self-efficacy users are, the more they find it easy to use e-learning system. Self-efficacy also enhances the effectiveness of e-learning activities. Consequently, user perceived that e-learning system is more useful. Roca *et al.* (2006), Chung *et al.* (2010), Cheng (2011) and Al-Busaidi (2012) supported the significant impact of self-efficacy on perceived ease of use. The impact of self-efficacy on perceived usefulness is proved in some previous e-learning researches (Ong *et al.*, 2004; Ong & Lai, 2006). Thus, we hypothesize that:

H8: Self-efficacy has positive influence on perceived ease of use

H9: Self-efficacy has positive influence on perceived usefulness

Anxiety is the mere construct in this study which causes negative effect. Compeau & Higgin (1995) defined Anxiety as the uncontrolled occurrence of an anxious or emotional reaction when it comes to perform a task (Compeau & Higgin, 1995). In IS context, Wang & Chiu (2011) defined anxiety as apprehension or discomfort experienced by an individual with technology. Anxiety is also referred to negative feelings detract from task performance. Regarding to e-learning researches, many researchers use computer anxiety instead of anxiety to explore their effect in e-learning activity. Sun *et al.* (2008)

defined computer anxiety as the level of learners' anxiety when they apply computers in e-learning. According to Ho & Kuo (2010), computer anxiety referred to the extent to which an individual's discomfort and unfamiliarity towards computers. However, we believe that anxiety in e-learning results not only from using computer but also other aspects. For example, the anxiety may associate with technology-related issues (new features of e-learning system), new environment with self-directed learning, no face to face assess with instructors, no peer support or time-pressure and so on. Therefore, we explore the impact of "anxiety" not "computer anxiety" in this study. We define anxiety as the degree to which users feel anxious and confused due to using e-learning system to learn.

The more anxious users feel about using e-learning system, the more they will perceive e-learning system is difficult to use. As defined above, perceived ease of use refers to the degree to which users believe that using e-learning would be free from physical and mental efforts. Consequently, anxiety will have negative effect on perceived ease of use. Some previous research findings in e-learning also supported the relationship between this two constructs (Van Raaij & Schepers, 2008). Regarding to the influence of anxiety on perceived usefulness in e-learning context, researchers mainly focus on the effect of anxiety on perceived usefulness via perceived ease of use (Brown, 2002; Al-Busaidi 2012). However, there are some researches in other IS field support the significant direct relationship between anxiety and perceived usefulness (Huang & Liaw, 2005). Thus, our hypotheses are:

H10: User anxiety has direct negative influence on perceived ease of use

H11: User anxiety has direct negative influence on perceived usefulness

2.2.5 User Satisfaction and Continuance Intention

User satisfaction and continuance intention to use are two important constructs to measure the success of information system. User satisfaction definition has received attention from many IS researchers since two decade ago (Rust and Oliver, 1994). According to Udo *et al.* (2011), user satisfaction is an indication of the customer's belief in the potential of a service leading to a positive feeling. Basing on this definition, in this study, we define user satisfaction toward e-learning as the degree to which the customers believe that the potential of using the e-learning system leads to a positive feeling. And continuance intention is the user's intention to re-use the e-learning system in the future.

In IS field, user satisfaction is often linked to two important IS models: D&M IS success model (DeLone and McLean, 1989) and ISCM (Bhattachjee, 2001). DeLone & McLean (2003) implied that user satisfaction is an important measure of IS success and also the easiest and the most useful way to evaluate IS success while ISCM model view it as the most important predictors of IS

continuance intention (Bhattachjee, 2001). The impact of user satisfaction on continuance to use is also confirmed by other IS research findings (Bokhari, 2005; Cho *et al.*, 2009). Particularly, in e-learning context, this causal link between these two constructs has been empirically supported (Hayashi *et al.*, 2004; Chiu *et al.*, 2005; Roca *et al.*, 2006; Lin *et al.*, 2011; Limayem and Cheung, 2011). Thus, we hypothesize:

H12: User satisfaction has positive influence on continuance intention.

3. RESARCH METHODOLOGY

3.1 Scale Development

The hypotheses are examined with data collected from papers questionnaires. There are eight constructs in this framework, which are perceived quality, perceived support, self-efficacy, anxiety, perceived ease of use, perceived usefulness, user satisfaction and continuance to use e-learning. According to literature review and operational definition, scale items are designed. This study uses Likert 5 point scale to measure where 1 reflects "strong disagree" and 5 reflects "strong agree". The scales in this study are almost generated from existing measures, which were used in the previous researches. The first construct, perceived quality with three dimensions of system quality, information quality and service quality, is measured with items mainly from Roca *et al.* (2006) and partly from other scholars (Wang & Wang, 2009; Udo *et al.*, 2011). There are twelve scales items in total. Perceived support, formed by the dimensions of organizational support, management support, and job support is measured with items from Selim (2007) and Al-Busaidi (2008), which are modified and reduced to eight. Perceived usefulness and perceived ease of use adopted four measure scales each from Roca *et al.* (2006) and Sun *et al.* (2008). Measures for anxiety and self-efficacy are constructed in accordance with the existing scales from Roca *et al.* (2006); Sun *et al.* (2008) and Wang& Wang (2009) with four items for each constructs. Measures for user satisfaction are constructed by modifying the existing related items (Roca *et al.*, 2006 and Sun *et al.*, 2008). There are totally four items. Continuance to use e-learning adopted four items from Roca *et al.* (2006).

3.2 Sampling and Analysis Method

This study focuses on the e-learning systems applied in educational section. Therefore, the PORTAL learning website of Yuan Ze University, YZU PORTAL was used for collecting data. YZU PORTAL homepage provides with alerting functions to remind the students of assignments deadline and inform the new messages from instructors and school. The instructors can also provide with the homework online allowing their students to submit their assignments by deadline.

Like many prior researches, students were regarded as our research sample. Our sample includes second-year and third-year undergraduate and second-year full time master students who have already used the PORTAL for at least one semester. In total, 330 questionnaires were distributed to Yuan Ze University undergraduate and graduate students. 268 responses were received (excluding 42 invalid and 20 incomplete responses). Thus, the valid response rate was 81.21%. The sample population, among which 57.46% were male and 2.54% were female, mainly below the age of 25 (88.43%). Besides, 26.12% were students of College of Management; 23.13% from College of engineering, 11.94% from College of Engineering and 21.64% from College of Informatics. And most of them spent from 20 to 30 hours per week on using internet (43.66%) and 88.4% use desk computer or laptop to log in YZU PORTAL.

4. RESEARCH ANALYSIS AND RESULT

4.1 Measurement Model

To ensure the validity of measurement model, we conducted confirmatory factor analysis and model fit test. Maximum Likelihood is used to calculate the model parameters. The estimates of standardized factor loadings, p-value, and SMC (R-square) of each item are found. As P - value of all items are smaller than 0.001, the factor loadings are statistically significant. Firstly, for convergent validity, items with factor loadings less than 0.6 or SMC less than 0.4 should be deleted. Hence, IS4, US3, SE2, SE1, PU1 and CI1 were removed.

Secondly, regarding to the model fit, most of fit indices fit the cut-off criteria except AGFI (CMIN=1389.075, DF=786, CMIN/DF=1.767, GFI= 0.807, AGFI= 0.778, RMR= 0.036, RMSEA= 0.054, TLI= 0.907, CFI=0.915, IFI=0.916). To improve the model fit, we based on modification indices to make revision. We also examine residual covariance of each item. According to principle of independence of residual, the items with excessive residual covariance cannot establish relevant link. Thus, IS1, US1, IQ2, and PEOU4 were removed because the absolute values of their residual covariance are quite high.

According to Blunch (2012), each construct should have at least two indicators. After modifying, except the construct of Instructor support, university support, self-efficacy and perceived usefulness with two indicators each, others have at least three indicators. Testing the modified model, standardized factor loadings ranges from 0.707 to 0.97 and SMC are between 0.484 and 0.958. Besides, competition model with model fit indices is established between original and modified models to verify the most appropriate one. Obviously, the model fit indices of modified model are much better than the original one. Therefore, the modified model is more suitable.

Furthermore, we computed Average Variance Extracted (AVE) and Composite Reliability of all

constructs of the modified models. AVE is the ratio of the construct variance to the total variance among indicators while composite reliability is defined as the quotient between the square of added standardized factor loadings and the sum of squared added standardized factors loading and the added error variances. According to Fornell and Larcker (1981), AVE is recommended threshold of 0.5. Since AVE values of all constructs exceed 0.5, convergent validity is proved to achieve. In addition, discriminant validity was assessed. According to Hair *et al.* (2008), the correlation matrix is used. When AVE is greater than the square of correlation coefficients, the model possesses discriminant validity. Table 1 exhibits the correlation matrix, of which the diagonal values are AVE and the others are square of correlation coefficients. Because all the squares of correlation coefficients are less than relevant AVE, discriminant validity is gained. As ideal convergent validity and discriminate validity are possessed, the measurement model obtains construct validity as well. The composite reliability of each dimension is above 0.7. Therefore, the model achieves high internal consistency.

Table 1. Correlation coefficients and AVE

	Mean	SD	PQ	CI	SAT	PEOU	PU	ANX	PS	SE
PQ	3.519	0.507	0.873							
CI	3.050	0.677	0.335	0.864						
SAT	3.463	0.664	0.534	0.521	0.814					
PEOU	3.636	0.669	0.370	0.402	0.579	0.791				
PU	3.326	0.566	0.353	0.440	0.511	0.349	0.763			
ANX	2.786	0.575	0.204	0.166	0.269	0.320	0.230	0.836		
PS	3.574	0.567	0.634	0.377	0.503	0.317	0.475	0.224	0.895	
SE	3.793	0.647	0.452	0.278	0.389	0.496	0.278	0.303	0.518	0.781
Composite Reliability (CR)			0.953	0.951	0.946	0.919	0.865	0.836	0.944	0.877

Note: (1) the diagonal elements indicate AVE; (2) p <0.001

4.2 Structural Model

After examining the measurement model through CFA and goodness-of-fit testing, we establish a structural model and conduct path analysis to verify the causal relationship among the constructs. First of all, the overall fit of the structural model is examined. The model is proved to gain good fit (Norm Chi square = 1.444, GFI=0.87, AGFI=0.844, RMR=0.024, RMSEA= 0.041, TLI =0.961, CFI=0.966, IFI=0.966).

Figure 1 displays a path diagram, which explains causal relationship of our proposed model. The results of path analysis shows that the higher the perceived quality is, the more it will impact on user satisfaction (path coefficient = 0.306, p<0.001). This result supports H1. The proposed relationships between perceived usefulness, perceived ease of use and user satisfaction are proved, which also supports H2, H3 (path coefficient=0.302, p < 0.001; path coefficient= 0.417, p<0.001). Besides, it clarifies that perceive support will have direct positive impact on perceived usefulness ((path coefficient= 0.643, p<0.001) and perceived ease of use (path coefficient = 0.214,

p=0.037), which supports H6 and H7. Anxiety has negative effect on perceived ease of use (path coefficient = -0.237, p < 0.001) and perceived usefulness (path coefficient = -0.188, p = 0.022), which supports H10 and H11. Self-efficacy is proved to influence positively on perceived ease of use (path coefficient = 0.415, p < 0.001), which supports H8. However, its affect on perceived usefulness is insignificant (path coefficient = -0.03, p= 0.82) so H9 is not supported. Finally, perceived ease of use, perceived usefulness and user satisfaction are confirmed to have direct positive impact on user's intention to continue using e-learning system. Therefore, H4, H5 and H12 are supported.
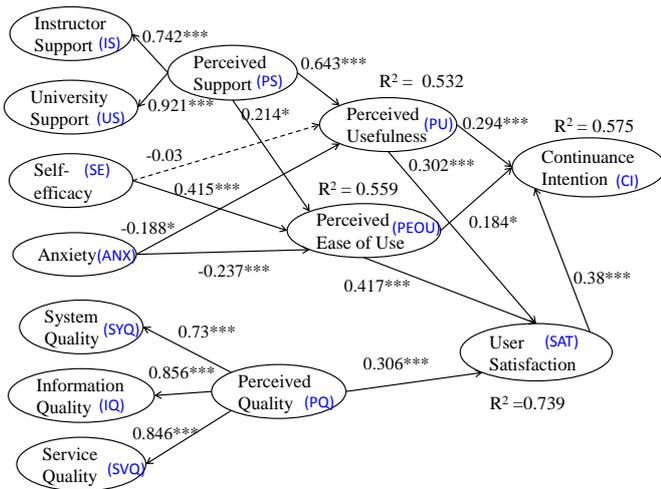

Figure 1. Results of Structural Model

5. Discussion and Conclusion

5.1 Discussion

On the ground of TAM, D&M IS success model and ISCM, our study aims at forming a more comprehensive model for predicting the e-learners' satisfaction and continuance intention. Besides, our proposed model also cover different dimensions of e-learning context including user, e-learning system, instructions and university dimensions which hardly been explored simultaneously before. There are 12 hypotheses in the proposed model. After data were collected and analyzed, most of the hypotheses are proved to be significant. Despite the similarity to the previous research findings, our statistics results imply some differences.

Prior researchers found that among the predictors of user satisfaction, perceived usefulness is the dominant one (Hayashi *et al.*, 2004; Roca *et al.*, 2006; Al-Busaidi, 2012). However, our findings are different. Perceived ease of use is proved to influence on user satisfaction more than perceived usefulness. Our statistics results also prove that perceived ease of use and perceived usefulness have significantly direct impact on user continuance intention to use e-learning. Thus, the role of perceived ease of use in

determining user's continuance intention cannot be underestimated.

Moreover, different from the findings of Ong *et al.* (2004) and Ong & Lai (2006), the impact of self-efficacy on perceived usefulness is shown to be insignificant. According to our research, the sampled students' self-efficacy is quite high while their satisfaction towards the YZU PORTAL learning system is lower. The results may come from the following cause. Users with high self-efficacy have orientation to highly expect for the perceived usefulness of e-learning system, which will lead to an increasing gap between their expectation and their perceived usefulness of YZU PORTAL e-learning system. Therefore, the user satisfaction will be decreased accordingly (Hayashi *et al.*, 2004).

5.2 Implications

5.2.1 Academic Implication

A lot of studies have been done on e-learning system in educational section, among which D&M IS success model, TAM and ECT theory have been applied widely. However, each of these theories has their own shortcomings. Therefore, we integrate TAM, D&M IS model and ISCM model to develop a comprehensive model for predicting e-learners' satisfaction and continuance intention to use e-learning systems. Different from TAM model, our framework focuses on the e-learners' post adoption instead of initial acceptance. Our research findings also indicate that there are more factors influencing on the success of e-learning systems rather than IS-related constructs proposed in D&M IS success model. Besides, our study proves that perceived usefulness is not the mere determinants of user satisfaction.

Another contribution of this research is that there are some variables that are hardly explored in the previous studies. Our research framework covers four dimensions regarding to the e-learning system in educational section including systems, learners, instructor, and university, which hardly been studied before. Besides, seldom have prior researchers done empirical analysis of the impact of instructor support and university support in the context of e-learning.

Furthermore, this study also proves the direct influence of perceived ease of use on users' continuance intention to use, which is usually ignored in the past researches. Also, the research findings emphasize the mediated role of user satisfaction in the relationship of perceived quality and users' continuance intention to use.

5.2.2 Practical Implication

Since perceived ease of use is one of the most important antecedents of user satisfaction and continuance intention, managers can increase the user satisfaction and re-usage intention by improving their beliefs of how user-

friendly the target e-learning systems are. Besides, perceived usefulness also plays a key role. Hence, managers can improve the users' beliefs that using the e-learning system will enhance their learning performance and effectiveness as well. As users' anxiety and self-efficacy have the direct impact on perceived ease of use and perceived usefulness. The managers should have policy to give clear instruction to the learners in using the e-learning system, which can reduce their anxiety and increase their confidence. Learners' self-efficacy will be improved accordingly.

Moreover, the managers should improve the attributes of the target system. Regarding to the information quality, the quality provided by the system should be clear, understandable and relevant. For service quality and system quality, managers should develop system with a reliable and prompt service and good user interface consistency.

Furthermore, instructors should motivate the e-learners to use e-learning systems regularly by emphasizing the benefits of usage and give clearer explanation about the materials uploaded. University management should highlight the importance of using e-learning and offer prompt assistance to solve e-learners' difficulties.

5.3 Future Direction

Due to the design of questionnaires, our study neglects the difference in internet usage habits among sampled students, which can be improved in future research.

For future research directions, there are some suggestions. Future research can study more about how users with different self-efficacy will influence on the research results and whether the research findings are consistent if this research framework is tested with optional e-learning system and compulsory e-learning systems.

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