The role of perceived usefulness on student satisfaction of learning management system - Case study of business students

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ABSTRACT: *The growth of information technology is changing the way of teaching and learning in higher education. E-learning system is a part of this change, which help students and instructions interact become easier. Learning management system (LMS) becomes more innovative and useful for learning activities regarding time and location. This paper examine the mediating role of perceived usefulness and self-efficacy on student satisfaction of LMS. We adopted the extended information system (IS) success model with perceived usefulness and self-efficacy as mediator. The model was tested with 220 students in University of Economics Ho Chi Minh City who use a LMS for most of the course they took. Partial least squares (PLS) technique is employed to test the possible mediating effects. The PLS analysis results revealed that Perceived usefulness fully mediate the relationship between service quality to learner satisfaction of LMS. Furthermore, research found that Perceived usefulness play as partially mediator which mediate the relationship between information quality and system quality with learner satisfaction*

KEYWORDS: **Learning management system; IS success model; e-learning; ECM.**

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1. Introduction

Nowadays, LMS has been used popularly in learning process in higher education. Al-Busaidi and Al-Shihi (2010) found that in developed countries such as USA, about 90% of the higher academic institutions have adopted LMS to provide courses and service via LMS platform. In Asia, through study of Yuen, Cheng, and Chan (2019a) about the student's belief and use influence to the system satisfaction of LMS in Hongkong, they said that about 94% of secondary schools used LMS to teaching and learning. This mean that using learning management system in online or distance learning courses not only very common in higher education section (Almarashdeh, 2016) but also in lower level education. Therefore, the universities, schools or organizations need to evaluate the effectiveness of the e-learning system by measuring user satisfaction with the system which is very important to the success of e-learning program (Barrio-García, S. D., & Romero-Frías, 2015; Bergersen, 2004). Otherwise, like the research of Sezer and Yilmaz (2019), university should build a measurement tool to examine the effective of LMS by apply some model, such as the UTAUT model, TAM.

Since, the e-learning system work as an platform that designed to facilitate encourages instructing and learning by utilizing internet browsers to set up collaboration among students and others. The e-learning system as LMS support the interaction between instructor and students like posting the learning material (Ong, 2019), submitting assignment or doing exams (Naveh & Shelef, 2017). Numerous establishments use e-learning since it encourages preparing, spares time and diminishes costs, for example, voyaging, printed materials, and research facility costs. Hence, LMS have made an important contribution to education. Universities in Vietnam used the traditional way to teaching and learning for a decade, in the turn of thiss century, have applied LMS to increase the satisfaction of both the students and lecturers, and reduce the cost for university. Some university like University of Economics Ho Chi Minh city have fully and successful use LMS to support the teaching and learning activities, but very few study have examine factors influence to the satisfaction of student in Vietnam after used LMS.

Moreover, researchers deeply study about the satisfaction of student or instructor (M. L. Cheok & S. L. Wong, 2015) with LMS by using the UTAUT and TAM. However, both of TAM and UTAUT mostly focus on technology part of LMS, lack of the research about the service part of the system. In other hand, some research focus on instructor satisfaction when using LMS such as research of Almarashdeh (2016), some other research focus on student satisfaction while using the system like Yuen, Cheng, and Chan (2019b). However, most of the

research looking for the results about the user technology acceptance or continuance of using this system. There are only few student have been carried out to measure the satisfaction of the users with the e-learning system. In this research, the students's satisfaction with LMS was learned by apply the Information system success model (IS success model). The popular and effectiveness measure was used, is the DeLone and McLean IS success model. The D&M model was first introduced in 1992 (DeLone & McLean) and was refreshed with certain adjustments in 2002, 2003 (DeLone & McLean). Unfortunately, some researchers pointed out that IS success model is a incompleted model (M. L. Cheok & S. L. Wong, 2015). Since the purpose of this study is to examined the satisfaction of students who used LMS, hence the extended IS success model are proposed. The extended model are combined between IS success model with expectation – confirmation model (ECM) (Bhattacherjee, 2001) and Self-efficacy to provide the complete model. ECM is one of the model examine the satisfaction of the user, which found that when users' experience was better than their expectation, it could lead to high satisfaction with the system (Joo, Kim, & Kim, 2016). Furthermore, research from W. S. Shin and Kang (2015) found that individual factor like self-efficacy will influence to perceived usefulness and lead to the satisfaction of the students for mobile learning management system.

Accordingly, this study purpose to examines the factors influence to vietnamese student satisfaction with the LMS by proposing a new theoretical model. The results fulfill the gap in the system satisfaction of students. Hence, the results of this study are expected to provide a better understanding of students satisfaction with e-learning technology. The extented IS success model which combined between ECM and IS success model was tested in this study.

2. Literature review

2.1. Theoretical Background

DeLone and McLean (1992) expressed in the IS Success model that system quality and information quality are the main indicators for the utilization of IS. That research built a large survey of IS success to estimates those two quality of the information system, and classify them into six constructs or dimensions: (1) system quality, (2) information quality, (3) systems use, (4) user satisfaction, (5) individual impact and (6) organizational impact. Ten years later, DeLone and McLean (2002) additionally adjusted their model to address a few limitations of the first model. A key option in the refreshed model was the consideration of Service Quality as an extra part of IS success model. It was included on the grounds that the changing idea of IS required the need to survey service quality when assessing IS success. E-learning systems are a specific type of IS (Lee & Lee, 2008; Wang, Wang, & Shee, 2007), the revised model of IS success model can be used for measuring the success of e-learning systems, in this study was LMS. Since this study purpose to examine satisfaction of students, the net benefit, intention to use, use was removed.

Expectation - confirmation model refers to the perception of user of the congruence between expectation of technology use and its actual performance (Bhattacherjee, 2001). Thus, ECM is a theoretical model to investigate the degree to which the users perceives the performance of system will satisfy their expectation (D. H Shin & Kim, 2012). ECM was built from the TAM (Davis, 1989) and expectation disconfirmation theory (EDT) model (Oliver, 1980)YYYYYR 8_YY (Fig. 1). Through the research about ECM, perceived usefulness have explained the satisfaction of users. Research of D. H. Shin, Shin, Choo, and Beom (2011) found the significant impacted to user satisfaction of perceived usefulness. To learn about students' satisfaction about LMS, this study combined the IS Success Model and ECM model with additional self-efficacy factor.

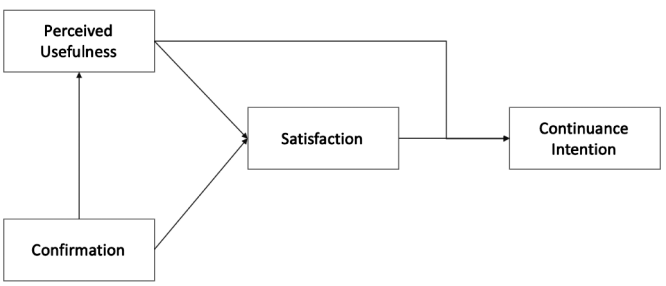

Figure 1: Expectation - confirmation model (Bhattacherjee, 2001)

2.2. Research Hypotheses

According to IS success model, service quality, system quality, and information quality are determinants of satisfaction. Whilst system quality in the e-learning fields refer to ease of use of the system (Freeze, Alshare, Lane, & Wen, 2010). Information quality refers to the characteristics of information such as accuracy, and format of information. Service quality was considered as user perceptions of the condition which support for the system use (Klobas & McGill, 2010). In a research about the effects of system quality on students and instructors' involvement to satisfaction with LMS, Klobas and McGill (2010) found that system quality has an effect on students' satisfaction, but the role of service quality as less impact to satisfaction. At the same year, Freeze at el (2010) identified that system quality and information quality can explain 83% of the student's satisfaction.

Research proposed three hypotheses:

H1: System quality (SQ) has a significant positive influence on student's satisfaction (SA) of using LMS

H2: Information quality (IQ) has a significant positive influence on student's satisfaction (SA) of using LMS

H3: Service quality (SerQ) has a significant positive influence on student's satisfaction (SA) of using LMS

Perceived usefulness refers to "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). From that research, researcher identified usefulness as the most dominant predictive variable in information technology usage. In the technology acceptance, perceived usefulness has been used as the mean variable to measure user behavior (Almarashdeh, 2016). From ECM, perceived usefulness influence to the satisfaction of users (D. H. Shin et al., 2011). Then hypothesis 4 are proposed:

H4: Perceived Usefulness (PU) has a significant positive influence on student's satisfaction (SA) of using LMS

Seddon and Kiew (1996) found that two factor system quality and information quality have strongly influence to usefulness when they test the first IS success model. From the research about post adoption usage of information system Saeed and Abdinnour-Helm (2008), authors found that system and information quality have influence to usefulness of the system. Later, Lin, Fofanah, and Liang (2011), in the context of e-government only Information quality was found have influence to perceived usefulness, while system quality shown that didn't influence to perceived usefulness with the e-government system in Gambia. Through above literature, still lack of research examine the relationship between service quality to perceived usefulness in the information system, especially in the context of e-learning. Hence, this study proposed three hypotheses:

H5: System quality (SQ) has a significant positive influence on student's perceived usefulness (PU) of using LMS

H6: Information quality (IQ) has a significant positive influence on student's perceived usefulness (PU) of using LMS

H7: Service quality (SerQ) has a significant positive influence on student's perceived usefulness (PU) of using LMS

Self-efficacy in education refers to the degree which individual belief that she or he can perform a specific task or achieve a goal (Bandura, 1977, 1997). In this study, follow the research of Liaw and Huang (2013), they said that self-efficacy may increase the students' satisfaction and usefulness toward e-learning system. M. L. Cheok and S. L. Wong (2015) proposed the self-efficacy influence to learner's satisfaction, in that research they said that the more confidence in using technology to engage in learning, the more learner will satisfaction with the e-learning system. Furthermore, the research about Malaysian undergraduate student found that self-efficacy has significant influence on perceived usefulness (Ong, 2019). Then, hypotheses H8 & H9 are proposed:

H8: Self-efficacy (SE) has a significant positive influence on students' satisfaction (SA) of using LMS

H9: Self-efficacy (SE) has a significant positive influence on students' perceived usefulness (PU) of using LMS

Based on literature, a hypothetical model was created as Fig.2 below:

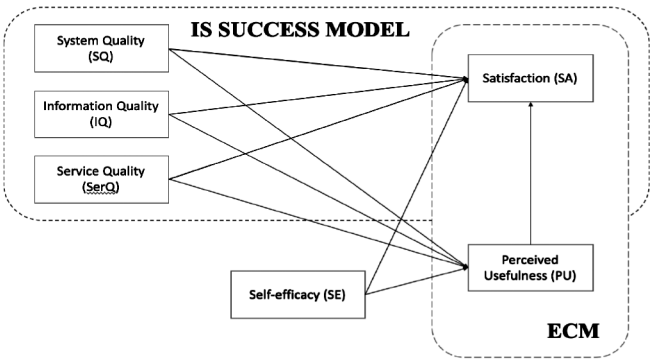

Figure 2: Research Model

3. Research methodology

3.1. Participants and contexts

This study is targeted students in higher education, then surveys were conducted from student of the University of Economics Ho Chi Minh city (UEH), Vietnam. UEH is the biggest university in economics and business field at the southern of Vietnam, with total around 35000 students. The E-learning management system of the University of Economics HCM City has applied since 2016. This tool is a medium for UEH students and teachers to contact through all learning courses. Teachers / Instructors can provide course materials and notifications on online courses that they design. Learners can raise questions and discuss with their lecturers on forums. One other benefit of this learning model for scholars is pre-learning lessons before they attend class. The E-learning system of UEH has many features including posting course materials, generating discussions, interacting between class, delivering assignments, conducting exams, getting feedbacks... To better understanding about student satisfaction with LMS, a questionnaire was distributed to 240 randomly selected students, most of participants have using LMS at least one years. The online questionnaire was distributed through the LMS system. From the 240 collected questionnaire, 20 was deleted due to the

missing data, then 220 valid responses are used for this research analysis.

3.2. Research Measurements

In this study, there are 35 measurement items divided into 6 parts which are System Quality, Information Quality, Service Quality, Self-Efficacy, Perceived Usefulness, and the last factor is User Satisfaction. In order to measure the student satisfaction with the LMS, then system quality, information quality, service quality and user satisfaction was adopted from DeLone and McLean (2002). The study proposed the extended IS success model which combine between the IS success with ECM, then Perceived usefulness was adopted from Bhattacherjee (2001) and Davis (1989). The self-efficacy factor adopted from Liaw and Huang (2013). In order to collect surveys, all the items were measured on a 5-point Likert scale (ranging from 1= strongly disagree to 5= strongly agree). The draft of the questionnaire firstly sent to 10 students for pilot test, and for their review. Then, the revised version follow the comments and suggestions was made.

3.3. Research Methods

In this research, to verify the dimensionality and reliability of the analyze variables some analysis was conducted such as factor loading, item-to-total correlation and internal consistency analysis (Cronbach's alpha). The fundamental structure model of the data is examined. While the internal consistency of each variables was measured by Coefficient (Cronbach's alpha), Correlation analysis assesses the degree of multicollinearity among variables.

For each research measurement, factor analysis is the primary utilized to recognize the dimensionality of the construct, to pick the elements with high factor loadings, and to compare these chose items with items suggested hypothetically. The results show that all of the variable loading are higher than 0.7, which mean that high value of reliability (Hair, Black, Babin, Anderson, & Tatham, 2010). From the outcomes of analysis, the results of all criteria are acceptable and the high degree of internal consistency is existed.

Then, a Partial Least Square (PLS) model objective is maximize the variance explained by the constructs or call prediction-oriented approach. This is to guarantee the reliability and validity of the measures prior to the attempt in making and drawing the conclusion on the structural model. With a specific goal of testing the hypothesized relationships between variables, Smart PLS 3.0 was applied to analyze the structural equation modeling. With PLS, t-value of bootstrapping techniques will evaluate the significance of the path coefficients and factor loadings.

4. Research analysis

Table 1 demonstrates the fundamental characteristics of the respondents, such as gender or learning grades. The results show that 60% of respondents are female, and 40% of respondents are male. It is suitable with the popularity of the UEH since the university major is economics and business and over 60% of student study at UEH are female. Most of the respondents are second and third year students since the research require respondent have at least a year of using LMS during study period.

Table 1: Characteristic - descriptive analysis of the respondent (n=220)

Question	Frequency	Percentage
Gender		
Male	88	40%
Female	132	60%
Learning Years		
Second Year	102	46.36%
Third Year	96	43.36%
Fourth Year	22	10.28%

In this study, discriminant and convergent validity was tested follow the procedure outline of Gefen and Straub (2005). Table 2 shows the corelation matrix with the square root of average variance extracted (AVE) values presented diagonally. The square root of the AVE values for the variables are consistently greater than the off-diagonal correlation values, suggesting satisfactory discriminant validity between the variables (Fornell & Larcker, 1981).

Table 2: Correlation among variables and square root of AVE (n=220)

	IQ	PU	SE	SerQ	SQ	SA
IQ	0.779					
PU	0.601	**0.836**				
SE	0.521	0.473	**0.758**			
SerQ	0.584	0.542	0.398	**0.818**		
SQ	0.603	0.505	0.497	0.525	**0.762**	
SA	0.624	0.72	0.525	0.511	0.581	**0.835**

Based on rule of thumbs of Fornell and Larcker (1981), convergent validity was evaluated by three criteria: all indicator factor loadings are greater than 0.5, composite reliability (CR) should greater than 0.8, and AVE by each

Table 3: Constructs internal consistencies and reliability values (n=220)

Construct	Item	CR	AVE	Cronbach's Alpha	Loading
Information Quality	IQ1	0.901	0.607	0.866	0.917
	IQ2				0.617
	IQ3				0.809
	IQ4				0.748
	IQ5				0.757
	IQ6				0.795
Perceived Usefulness	PU1	0.921	0.699	0.892	0.809
	PU2				0.811
	PU3				0.880
	PU4				0.820
	PU5				0.859
Self-efficacy	SE1	0.87	0.574	0.814	0.773
	SE2				0.770
	SE3				0.675
	SE4				0.810
	SE5				0.754
System Quality	SQ1	0.917	0.581	0.897	0.750
	SQ2				0.798
	SQ3				0.801
	SQ4				0.728
	SQ5				0.749
	SQ6				0.745
	SQ7				0.768
	SQ8				0.755
Service Quality	SerQ1	0.924	0.67	0.901	0.811
	SerQ2				0.858
	SerQ3				0.850
	SerQ4				0.860
	SerQ5				0.788
	SerQ6				0.735
Satisfaction	SA1	0.92	0.697	0.891	0.839
	SA2				0.795
	SA3				0.836
	SA4				0.823
	SA5				0.879

construct should greater than 0.5. Convergent validity indicates the extent to which the items of a scale that are theoretically related are also related in reality. As shown in table 3, all items have significant ($p<0.001$) path loadings greater than the threshold 0.6. Whilst, all the constructs have CR values between 0.87 and 0.92, and all AVE values greater than 0.5 of total variance, then the convergent validity are confirmed. Overall, these test of validity and reliability provide high degree of confidence about the scale items used in testing research model.

The test of the structural model includes estimates of the path coefficients, which indicate the strength of the relationships between the dependent and independent variables, and the R2 values, which represent the amount of variance explained by the independent variables. Figure 3 shows the results of the hypothesized structural model for student satisfaction with the LMS.

The results show that two hypotheses H1 and H3 are rejected, mean that system quality did not have direct effect to satisfaction of student when using LMS ($b = 0.174$, $p > 0.05$), and service quality did not have direct effect to student's satisfaction ($b = 0.024$, $p > 0.05$). In contrast, information quality ($b = 0.161$, $p < 0.05$), and perceived usefulness ($b = 0.463$, $p < 0.001$), and self-efficacy ($b = 0.126$, $p < 0.05$) have strongly influence to students' satisfaction. Moreover, most of factors have significant influence to perceived usefulness of the system, such as System quality ($b = 0.155$, $p < 0.05$), information quality ($b = 0.329$, $p < 0.001$), service quality ($b = 0.200$, $p < 0.05$), and self-efficacy ($b = 0.201$, $p < 0.05$).

5. Research discussion and conclusion

Research about user satisfaction with the information system are widely topic. In the context of e-learning system, some research study the student satisfaction (Yuen et al., 2019b), other researchers studied instructors satisfaction or both students and instructors like Almarashdeh (2016) and Islam (2015). However, that researches mostly focused on the system quality (Almarashdeh, 2016), lack of research conduct both system quality and also the user ability to use the system. In this study, the extended IS success model was proposed to test the student satisfaction with the system. The findings indicate that information quality has significant effect on user satisfaction. Whilst, this study found that the relationship between system quality, service quality to satisfaction are fully mediated by perceived usefulness of the system.

From the previous studies about user satisfaction, both three factors of IS success model was significantly influence to satisfaction(Almarashdeh, 2016), however, when perceived usefulness was add to the model, two

factors are indirectly influence to satisfaction. That means, if the LMS provides a good information such as accuracy, or content quality to student to learn, then student will more satisfy with the system. Furthermore, when the student found the useful of LMS system like ease to use, and provide a good service quality, they would satisfy with the system (Ba & Johansson, 2008). In contrast with study of Almarashdeh (2016) when examine the instructors' satisfaction, found that perceived usefulness and service quality are mostly influence to instructor satisfaction, the results of this study shows that in the student point of view, perceived usefulness and information quality are taking the biggest percentage on impact to satisfaction. The suggestion is to ask teachers and instructors to provide more information, and interact more, keep update information through the LMS for teaching.

The results of this study also confirmed the self-efficacy influence to both the perceived usefulness and satisfaction with the LMS. This mean is if the students have the ability to approach computers, then they will consider LMS are easy to use system, then they will more satisfy with the system.

Overall, there are practical implications for teachers and practitioners, first, the perceived usefulness and information quality have strongly effect on student satisfaction with LMS. The LMS system design, and information about the course provide through the system should be accuracy, up to date, and useful for students. This study makes a significant contribution to understand the factor influence to Vietnamese student satisfaction with e-learning system.

The first limitation is that the number of respondents was quite small (240 people). In addition, this study does not cover all students in university. The number of students participating in the survey mostly focused on the second year students, which led to the survey results which were not objective of many other courses. This is the biggest defect of this study. The second limitation of this study is that the research was launch online so some of the respondent's answers were unreliable. Many participants responded quite superficially and unfocused, therefore, which greatly influenced the research results. The final limitation of this study is the shortage of factors. There are more components that can affect student satisfaction with the LMS system. Although the study has many shortcomings, however, these limitations still bring positive results. This study has provided some useful data for student satisfaction with LMS and not good points of LMS system. This report may become a useful reference for later similarly studies in the future.

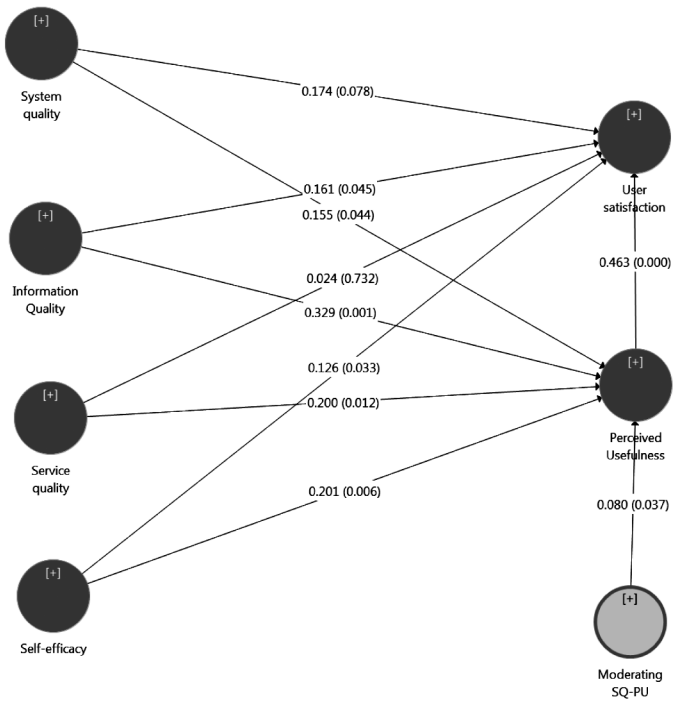

Figure 3: PLS analysis results

Table 4: The summary of hypothesis testing

Hypotheses	b	p	Results
H1: SQ - > SA	0.174	0.078	Rejected
H2: IQ - > SA	0.161*	0.045	Accepted
H3: SerQ - > SA	0.024	0.732	Rejected
H4: PU - > SA	0.463***	0.000	Accepted
H5: SQ - > PU	0.155*	0.044	Accepted
H6: IQ - > PU	0.329***	0.001	Accepted
H7: SerQ - > PU	0.200*	0.012	Accepted
H8: SE - > SA	0.126*	0.033	Accepted
H9: SE - > PU	0.201**	0.006	Accepted

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