

# EXAMINING UCSA STUDENT PORTAL SUCCESS FROM THE PERSPECTIVE OF MODIFIED De LONE McLEAN SUCCESS MODEL

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## **ABSTRACT**

*UCSA's student portal has been implemented since 2005. Due to the fact that UCSA's student portal is only for registration purposes and time-table viewing, the hit account throughout the year was not so high. Based on limited IT budgets and the need to justify investment in student portals, assessing the benefits of these is an important field in research and practice. This study uses the modified De Lone McLean success model (Delone & McLean, 2003) in the context of a student portal. The hypothesized model is validated empirically using a sample collected from 279 students of UCSA. The results demonstrate that satisfaction was found to be positively related to users' continuance intention explaining a total of 67% variance. The implications of these findings for e-learning practitioners are discussed at the end of this work.*

Keywords: continuance intention, service quality, satisfaction, structural equation modeling, student portal

## INTRODUCTION

The measurement of information systems (IS) success or effectiveness has been widely investigated by the IS research community. However there is a lack of studies on applying IS success model in the context of continuance intention. Previously, numerous studies only focusing on initial acceptance e.g.; (Lin, (2007); Masrek, (2007); Chen & Cheng, (2009) whereas eventual success depend on its continued use rather than first-time use (Bhattacharjee,( 2001). The importance of continuance is clear, that is customer turnover will lead to acquiring new customers that may cost as much as five times more than retaining existing ones (Bhattacharjee, (2001).

The success of retaining customers will help organizations by reducing the cost of and increasing availability of training. Present study desired to explore individuals' intentions to continue using student portal system. De Lone & Mc Lean IS Success model were used to measure student portal success and thus obtain an understanding of individuals' continuance intention towards using portal system. From the perspective of continuance intention, previous studies utilized numerous of determinants and IS model e:g Self-Determination Theory (Roca & Gagne, (2008); Expectation-Confirmation Model (Bhattacharjee, (2001); Personal Innovativeness (Shih-Wei Chou, (2009); UTAUT-Unified Theory of Acceptance and Use of Technology (Chiu & Wang, (2008); Technology Acceptance Model-TAM (Wangpipatwong & Wichian Chutimaskul, (2008); Terzis & Economides, (2011); Roca, Chiu, & Martí'nez, (2006); user e-learning experience (Lin K.-M. , (2011); subjective norm (Lee, 2010); contribution intention (He & Wei, (2007); habit (Limayem, Moez, Hirt, & Cheung, (2007).

Previous research has shown that satisfaction have a relationship between satisfaction and continuance intention (Bhattacharjee, (2001; Yu-Hui Tao, (2009); Kang, Hong, & Lee, (2008); Chen, Yen, & Hwang, (2012); Wen-Shan Lin, (2011); Shih-Wei Chou, (2009).Oliver (1980) demonstrated that satisfaction will lead to intention to use. Consequently, we also argued that

satisfaction influenced student portal system continuance intention through these variables. Antecedent of the satisfaction was also included in this study as proven in previous study: information quality (Chen & Cheng, (2009); system quality (Wang, 2008) and service quality (Wang, (2008). Therefore, we considered De Lone & Mc Lean Success Model as a determinant of continuance intention

## **THEORY AND LITERATURE REVIEW**

### *Student portal system*

The definition of portal is still not clearly defined (Masrek, (2007). However, in general, it is defined as a single, personalized interface through which users access all information resources and services in a secure, consistent and customizable manner (Masrek, (2007). The portal is resource-based as the members can download and upload all kinds of information such as documents, articles, websites, software, exercises, video upload, links to interesting events (Pynooet *et al.*(2012). In the context of UCSA, the new implemented portal information system helps students for registration purposes and timetable viewing. However since its inception, no studies have been conducted to assess measures of the adoption of the portal

### *De Lone Mc Lean Success model*

There are several measures of Information system success. De Lone & McLean (1992) reviewed comprehensively the different information system success measures and proposed a six-factor IS success model as a taxonomy and framework for measuring the complex dependent variables in IS research (Wang, 2008). They are System Quality, Information Quality, IS Use, User Satisfaction, Individual Impact and Organizational Impact. However, Delone & Mclean (1992) did not provide an empirical validation of the model and suggested that further development and validation was needed for their model as well as it was not well accepted by the management IS community (Chen & Cheng, (2009) as it ignores the emergence of new economic activities. Because of the criticisms suffered from other studies, Delone & McLean (2003) proposed the updated version of the IS success model in 2003.

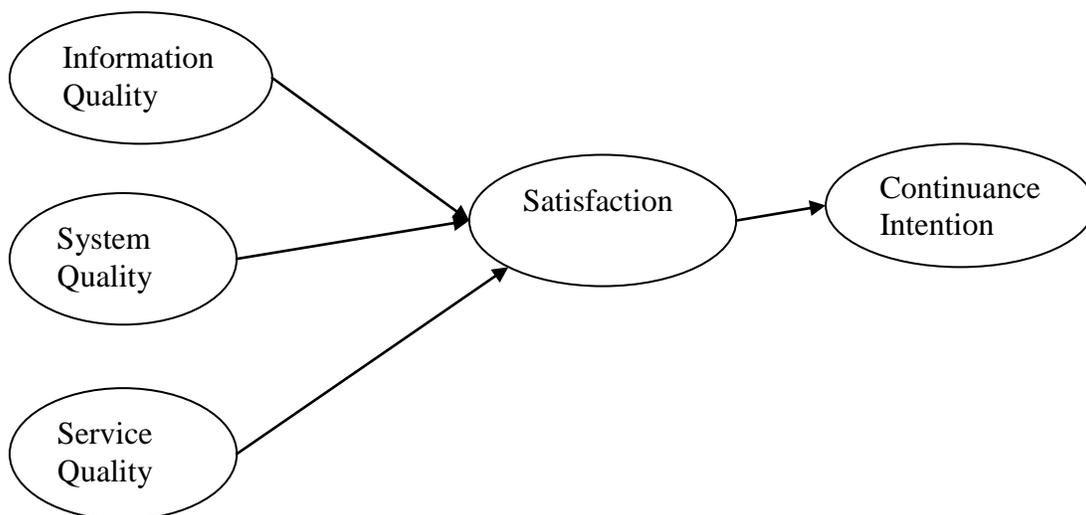
The objective of this new model was to update the old one and evaluate its usefulness in light of dramatic change in information technology (IT) evolution, especially the emerging

growth of e-commerce. The major alteration that has been made to the model was the addition of a ‘service quality’ construct and a partial division of the ‘use’ construct into ‘intention to use’ and ‘actual use’. DeLone & McLean (2003) also combined the individual and organizational impacts of use into a single factor called ‘net benefits’. Although the model has been revised, it still needs further validation before it can serve as a basis for the selection of appropriate IS measures (Wu & Wang, (2006). Wang (2008) extended the model to explain e-commerce success in terms of reuse as a dependant variable. Therefore, it seems reasonable to assume that De Lone & Mc Lean IS Success model can be used to study the continuance.

## RESEARCH MODEL AND HYPOTHESES

The main focus of IS research is to know why and how individuals choose to adopt new technologies (Schaappa & Lemuria Carter, (2010). Numerous studies ( Venkatesh, Morris, & Davis (2003); Davis, (1989); Su-Chao Chang, (2008); Park, (2009); Abdulhameed Rakan Alenezi, (2010); I-Fan Liu & Yeali Sun, (2010); Il Im & Kang, (2011); Boštjan Šumak, (2011); Vachiraporn Khayun, (2011); Shu-ming Wang,( 2011) have shown that all those variables involved in the studies affected individuals to adopt new technologies at initial stages but not at eventually success. The study on long-term viability of an information system is crucial. Therefore, the proposed model uses satisfaction, information quality, service quality and system quality to explain students’ continuance intention to use student portal system in UCSA (Fig. 1)

**FIGURE 1 PROPOSED RESEARCH MODEL**



## *Satisfaction*

Satisfaction is defined as emotional reactions to the transaction of business (Oliver, (1980). Satisfaction is considered as an important determinant of continuance intention (Bhattacharjee, (2001) and critical to the survival of an organization (Kettinger & Sung-Hee “Sunny” Park, (2009). If the customer has good experiences of using MIM (mobile instant message) over time, then he will have cumulative customer satisfaction (Zhaohua Deng, (2010). Wang (2008) reported that customers’ satisfaction with e-commerce was significantly associated with their continuance intentions. Therefore, the following hypothesis is proposed.

H1 Satisfaction is positively related to student’s continuance intention to use UCSA’s student portal

## *Service Quality*

Service quality has been widely studied since the early work of Zeithaml & Leonard L. Berry (1996). Oliver (1980) argued that, service quality is a performance perception which influences customer satisfaction through two mechanisms, directly via customer observation of good or bad service quality and indirectly via an input to the disconfirmation comparison (i.e. discrepancy between performance and expectation). Service quality was a late addition to the De Lone and McLean model (Trkman & Trkman, (2009). Parasuraman & Zeithaml (1985) proposed that higher level of service quality result in increased customer satisfaction. In recognition of the expanded role of the IS department and the importance of IS and e-commerce (EC), researchers have begun to include service quality as a measure of IS satisfaction/success in recent years.

Prior studies, Kettinger & Sung-Hee “Sunny” Park (2009) indicated that service quality was significantly related to customer satisfaction. Therefore, the following hypothesis is proposed. Therefore, we proposed

H2. Service quality is positively related to student’s satisfaction with UCSA’s student portal.

### *Information Quality*

According to Gorla & Toni M. Somers (2010), information quality is a concept that is related to the quality of information system output, can be described in terms of outputs that are useful for business users. As stressed by Salaun & Flores (2001), good quality information is becoming a necessary prerequisite for the setting-up of an active partnership between supplier and consumer (in this case-the student portal system and the students). Delone & Mclean (1992) IS success model suggests that higher level of information quality result in increased user satisfaction. Chen C.-W. (2010) and Landrum, Prybutok, & Zhang (2010), indicated that information quality had a significant effect on user satisfaction. Accordingly, the following hypothesis was proposed.

H3. Information Quality is positively related to student’s satisfaction with UCSA’s student portal.

### *System Quality*

The concept of system quality, first introduced by Delone & Mclean (1992), was defined as quality manifested in a system’s overall performance and measured by individuals’ perceptions (Delone & McLean, (3). Somers & Somers (2010) defined system quality as quality of information processing itself, which is characterized by employment of state-of-the-art technology, a system offering key functions and features (which is denoted as IS excellence, and software) that is user friendly, easy to learn, and easily maintainable (which is denoted as IS value). Cheung & Lee (2011) examined the users’ satisfaction on e-learning portal. They found that system quality affected overall satisfaction and was the best predictor of satisfaction. Prior studies on IS success (Wang, (2008); Wu & Wang, (2006); Chen & Cheng, (2009) have also provided support for the notion that system quality positively affected user satisfaction. Accordingly, the following hypothesis was proposed.

H4. System Quality is positively related to student's satisfaction with UCSA's student portal.

## METHOD

### *Sample*

The participants for current studies comprised 279 students from UCSA who use UCSA's student portal for course registration. Of the 300 questionnaires distributed, 279 were completely filled. Regarding gender, female samples were the majority of total samples; the percentage of females was around 76%. For the semester currently studied, semester 4 is the majority of the sample. Concerning course taken, 44.4% was from Nursing (UCSA) program. The rest are Pharmacy 7.5%, Medical Lab Technology 2.5%, Art & Design (UiTM) 2%, Diploma in Science (UiTM) 0.7%, Nursing UiTM 6.1%, Office Management UiTM 5%, BA Business (UPM) 1.1%, Diploma in Business (UPM) 5.4%, Property management UTM 3.6%, Quantitative Surveying (UTM) 11.5%, Architecture (UTM) 6.1% Computer Science UTM 1.8%, Medical Assistance (UCSA) 1.8%

### *Instrument development*

Our research model includes five constructs, each of which was measured with 28 items. All items were obtained from previously validated instruments. After the questionnaire was formulated, it was tested among several students. Based on their comments, some were revised to improve the readability. Each item was measured with a seven point Likert scale, whose answer choices range from "strongly disagree" (1) to "strongly agree" (7). Continuance intention was measured with three items and adapted from Bhattacharjee (2001). While the measures of satisfaction (eight items), information quality (six items), service quality (four items) and system quality (seven items) were adapted from Delone & McLean (2003) and Chao-Min Chiu & Chang (2007). All of the items used were modified to the context of student portal.

## *Data Analysis*

This study employs a two-step structural equation modeling (Anderson & Gerbing, (1988). It performs confirmatory factor analysis (CFA) analysis on the items corresponding to the constructs. The reason of adopting SEM for analyze the relationship between variables is due to general theoretic of social science and behavioral science, which is usually constructed by some unobservable or unmeasured variance (Pai & Tu, 2011)

## RESULTS

### *Psychometric properties measures*

Psychometric properties measurement involves assessing internal consistency and construct validity. The traditional criterion for assessing internal consistency is Cronbach alpha (Table 1) while the recent one is uses composite reliability (Urbach, Smolnik, & Riempp, (2010). The CA values in our model are exceeding recommended value of 0.5 (Fornell & Larcker, 1981) while CR values indicated above the generally recommended minimum of 0.7 (Nunally & Bernstein, (1994). All of the variables in this study were adapted from relevant literature thus exhibited strong content validity.

Convergent validity was evaluated for the measurement scales using two criteria suggested by (Fornell & Larcker, (1981): (1) all indicator factor loadings should be significant and exceed 0.70 and (2) average variance extracted (AVE) for each construct should exceed the variance due to measurement error for that construct (i.e., should exceed 0.50). As shown in Table 1, most items exhibited loading higher than 0.7 on their respective constructs, providing evidence of acceptable item convergence on the intended constructs. Therefore, all conditions for convergent validity were met.

**TABLE 1 RESULT OF CONVERGENT AND RELIABILITY TEST**

Construct items	Std. loading	Composite reliability	AVE	Cronbach Alpha
SATISFACTION		0.89	0.73	0.89
Satis4	0.80			
Satis5	0.88			
Satis6	0.88			
SYSTEM		0.88	0.65	0.88
System 3	0.80			
System 6	0.83			

System 5	0.80			
System 4	0.80			
INFORMATION				
IQ 4	0.86	0.9	0.7	0.9
IQ 3	0.84			
IQ 2	0.84			
IQ 1	0.81			
SERVICE				
SQ1	0.79	0.88	0.7	0.87
SQ2	0.86			
SQ3	0.86			
CONTI				
Continuance 1	0.86	0.92	0.79	0.91
Continuance2	0.94			
Continuance3	0.86			

Discriminant validity assesses the extent to which a concept and its indicators differ from another concept and its indicators (Bagozzi, Yi, & Phillips, (1991). 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, had cross loading coefficients that are at least 0.10 lower than the factor loading on their respective assigned latent variables (Gefen & Straub, (2005). Overall, the measurement model demonstrated adequate reliability, convergent validity and discriminant validity.

**TABLE 2 ITEM-CONSTRUCT CORRELATION**

ITEMS	SYSTEM	INFORMATION	SERVICE	SATIS	CONTI
System3	<b>0.80</b>	0.65	0.66	0.59	0.49
System6	<b>0.83</b>	0.67	0.68	0.62	0.51
System5	<b>0.80</b>	0.65	0.66	0.59	0.49
System4	<b>0.80</b>	0.65	0.66	0.60	0.49
IQ4	0.70	<b>0.86</b>	0.64	0.67	0.52
IQ3	0.68	<b>0.84</b>	0.62	0.66	0.51
IQ2	0.69	<b>0.84</b>	0.63	0.66	0.51
IQ1	0.65	<b>0.81</b>	0.60	0.63	0.49
SQ1	0.65	0.59	<b>0.79</b>	0.55	0.43
SQ2	0.71	0.64	<b>0.86</b>	0.60	0.47
SQ3	0.71	0.64	<b>0.86</b>	0.60	0.47
satis4	0.59	0.62	0.55	<b>0.80</b>	0.53
satis5	0.66	0.69	0.61	<b>0.88</b>	0.59
satis6	0.66	0.69	0.61	<b>0.88</b>	0.59
Continuance1	0.53	0.52	0.46	0.58	<b>0.86</b>
Continuance2	0.58	0.57	0.51	0.63	<b>0.94</b>
Continuance3	0.53	0.52	0.46	0.57	<b>0.86</b>

### *Evaluation of the measurement model*

The measurement model for the construct is measured using confirmatory factor analysis. This procedure is done using AMOS 18. To demonstrate a reasonable fit for the model, a number of fit indices were computed including Chi-square/degrees of freedom, Goodness-of-fit index (GFI), Adjusted Goodness-of-fit Index (AGFI), Adjusted Goodness-of-fit Index (AGFI), Comparative Fit Index (CFI), and Root Mean Square of Approximation (RMSEA). A very good fit is normally deemed to exist when GFI and CFI are greater than 0.90, Root Mean Square of

Approximation (RMSEA) is around 0.10 (Hair & Black , (2006), and AGFI is greater than 0.80. The chi-square was not used because it is sensitive to sample size. Thus, the use of relative (*chi-square/df*) seemed appropriate; it is assumed that value less than 3 is indicative of an acceptable fit (Bagozzi & Yi, (1988).

The indices for the measurement model 1 with all 28 items showed that the data did not fit well (see Table 3). Some of the indices, such as GFI (0.79), and AGFI (0.75) were below acceptable levels. Therefore, the measurement model was reevaluated. Anderson & Gerbing (1988) suggested four methods to improve model fit: (1) relate the indicator to a different factor, (2) delete the indicator from the model, (3) relate the indicator to a multiple factor, or (4) use correlated measurement error. The researchers stated that the first two methods are preferred because they preserve unidimensional measurement (Cho, Johanson, & Guchait, (2009), whereas the second two methods do not. Therefore, we chose to delete the indicators instead of relating them to a different factor because we could not find a theoretical support for the approach. This process resulted in the deletion of 10 items to improve the model fit, A respecification of Model 1 without these items was necessary to improve it. In the deleting procedure, each item must be deleted one at a time (Kim, (2008) and Model 1 was reevaluated. In order to make sure that deleting those items did not worsen the reliability and validity of the constructs, we conducted a composite reliability and validity test for the first measurement model (before deleting the items) and the modified measurement model (after deleting the items).

Table 3 shows the results of the composite reliabilities and validity for the two models. The composite reliabilities were satisfactory for both models which exceeding the minimum criterion, .50 (Fornell & Larcker, (1981). After discarding those items, the measurement model, Model 2, was reevaluated; its indices indicated a good fit which is chi-square/degree of freedom = 2.24, GFI = .91 and AGFI = .873.

**TABLE 3: RESULT OF COMPOSITE RELIABILITY AND VALIDITY**

CONSTRUCT	Number of items		Composite reliability		convergent validity (AVE)	
	1st model	2nd model	1st model	2nd model	1st model	2nd model
SYSTEM	7	4	0.91	0.89	0.60	0.65
INFORMATION	6	4	0.92	0.90	0.64	0.70
SERVICE	4	3	0.90	0.88	0.68	0.70
SATIS	8	3	0.94	0.89	0.67	0.73
CONTI	3	3	0.92	0.92	0.79	0.79

### *Evaluation of the structural model*

For the purpose of examining the structural model, we use a similar set of model-fit indices. (Table 4) shows the estimation from the structural modeling.

**TABLE 4 SUMMARY OF THE OVERALL FIT INDICES FOR MEASUREMENT MODEL 1 AND 2**

Model	Chi-Square/df	GFI	AGFI	TLI/NNFI	CFI	RMSEA
Measurement model 1	2.85	0.79	0.75	0.90	0.91	0.08
Measurement model 2	2.24	0.91	0.87	0.96	0.96	0.07
Structural model	2.26	0.91	0.87	0.95	0.96	0.07
Suggested value	≤3	>0.95	≥0.80	≥0.90	≥0.90	<0.08

The overall fit of model is satisfactory, with all of the relevant goodness of fit indices greater than 0.90. The GFI is 0.91 (Bagozzi & Yi, (1988), the AGFI is 0.87, which is above the acceptable level of 0.8 (Etezadi-Amoli & Farhoomand, 1996) and the TLI/NNFI is 0.95, which is considered to be acceptable as recommended by (Hair *et al.* 2010) and RMSEA showed a very

satisfactory level of 0.07 (Hair *et al.*, 2010). Another statistic test to assess model fit is normed chi-square value (a chi-square divided by degrees of freedom). Our model shows satisfactory level of 2.26, a value that is appropriately below the benchmark of three, to indicate good overall model performance (Shin, (2009; Bagozzi & Yi, (1988) . Hence we conclude that our model demonstrates good model fit.

### *Hypotheses testing*

The four hypotheses presented above were tested collectively using the structural equation modeling (SEM) approach and performed using AMOS 18. The path significance of each hypothesized association in the research model and variance explained ( $R^2$  value) by each path were examined. Table 5 shows the standardized path coefficients and path significances. Three hypothesized associations were strongly significant at  $p < 0.05$ , except for the links between service quality and continuance intention. The continuance intention to use student portal in this study was predicted by satisfaction ( $b = 0.79, < 0.01$ ), While satisfaction was jointly predicted by information quality ( $b = 0.72, < 0.01$ ) and system quality ( $b = 0.40, p < 0.05$ ). Service quality did not significantly influence satisfaction. These variables together explained 67% of the variance of satisfaction ( $R^2 = 0.67$ , coefficient of determination). In addition satisfaction explained 48% of the variance of continuance intention ( $R^2 = 0.48$ , coefficient of determination). (Fig.2)

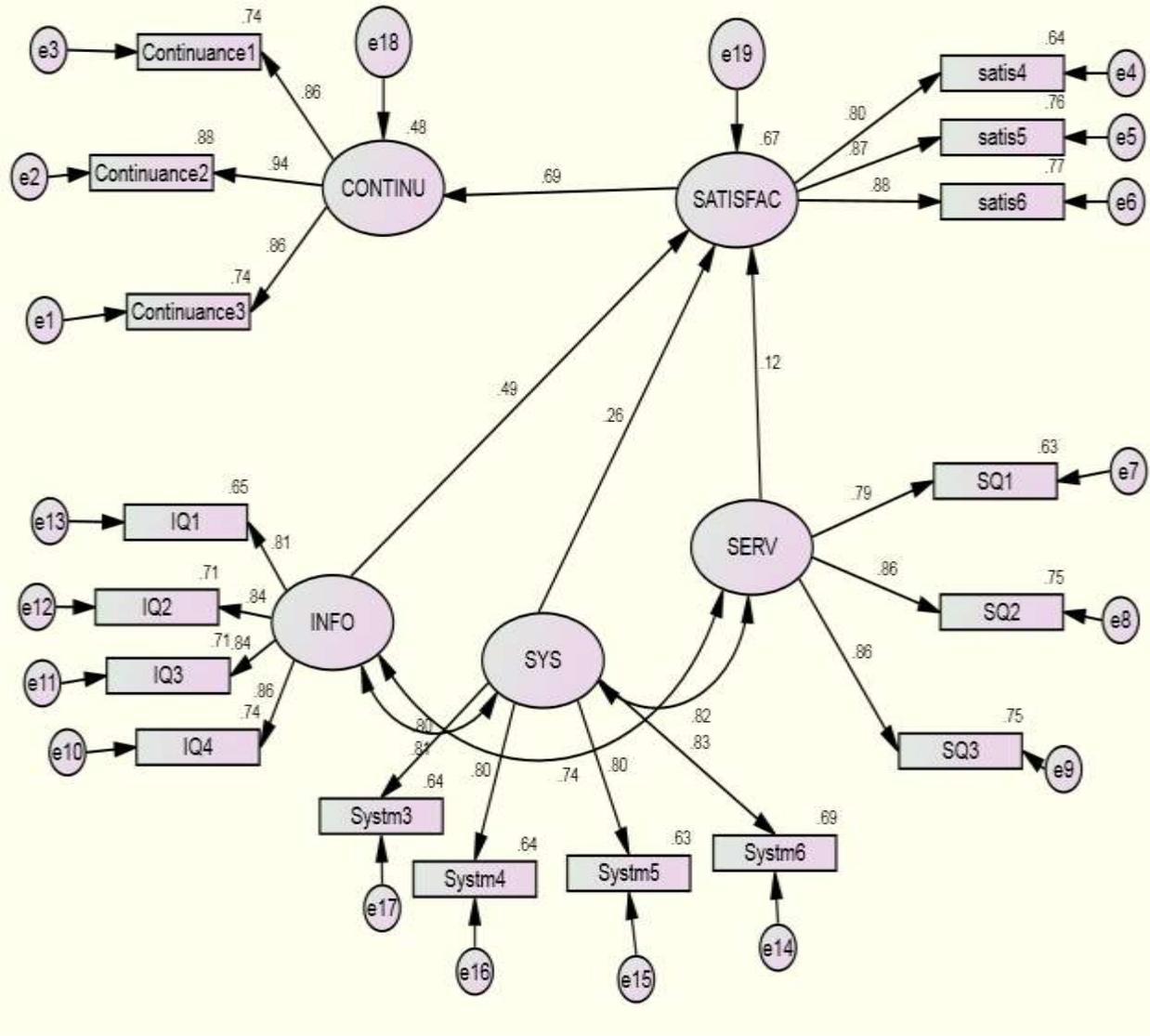
**TABLE 5: THE RESULT OF TESTED HYPOTHESES**

Hypothesis	Effects	Path coefficient	C.R	Result
H1	Satisfaction → student's continuance intention	0.79	10.9**	Supported
H2	Service quality → student's satisfaction	0.17	1.286	Not supported
H3	Information Quality → student's satisfaction	0.72	5.209**	Supported
H3	System Quality → student's satisfaction	0.4	2.266*	Supported

\*values are critical ratios exceeding 1.96, at the 0.05 level of significance

\*\*values are critical ratios exceeding 2.32, at the 0.01 level of significance

FIGURE.2. STRUCTURAL MODEL



## DISCUSSION

This study attempts to examine the validity of modified De Lone & Mc Lean (Delone & McLean, (2003) in educational context and continuance intention as dependent variable. The study's research question is focused on empirically validating service quality, information quality, systems quality on student satisfaction while continuance intention affected by satisfaction.

### *Implication for research*

This study empirically validates De Lone & Mc Lean Success Model in the context of education. Research on De Lone & Mc Lean Success Model on continuance intention is still in early stages. This study introduces De Lone & Mc Lean Success Model as a predictor of student's continuance intention to use UCSA student portal. De Lone & Mc Lean Success Model helps to explain why students are willing to continue to use student portal. The proposed model can serve as a spring board for future research in the context of education and continuance as a dependant variable. Future research should look to investigate the significance of demographic difference (e.g., age, gender, culture).

### *Implication for practice*

The implications of this study are twofold. There are several implications for the organization (UCSA) and students. The study highlights the fact that students continuance intention to use UCSA portal is significantly influenced by their satisfaction towards the system which they are using to register their subjects and view timetable. Satisfaction has shown to explain students' satisfaction toward the system. This highlights to the organization (UCSA) the fact that satisfaction towards the system which are information quality, system quality and service quality is absolutely critical.

As suggested by Bhattacharjee (2001), IS continuance intention is determined primarily by their satisfaction with prior IS use. It's essential for organization to ensure that each student is satisfied with the system provided by the organization. When satisfaction is not met, continuance intention is impossible because the whole system has lost its credibility from the eyes of the

individual user. Prior research has shown that satisfaction plays a significant role on continuance intention (Bhattacharjee, (2001; Yu-Hui Tao, (2009); Kang, Hong, & Lee, (2008); Chen, Yen, & Hwang, (2012); Wen-Shan Lin, (2011); Shih-Wei Chou,( 2009). Thus, satisfaction is vital to ensure the retention of the students in continuing their intention to use the portal. However, in order to ensure the students are satisfied, the system provided shall meet the reasonable quality. By revealing the factors affecting satisfaction, the present study contributes to organization by the fact that providing the IT infrastructure that meets the needs of the students is vital. Factors that affect customer satisfaction have been proven through this study.

The relationship between information quality and satisfaction was found significant, consistent with previous studies (Wang, (2008); Lin, (2007). System quality was also found to be significant. This is also consistent with prior studies (e.g., Chen & Cheng, 2009; Lin, 2007). Organization should maintain the quality system and quality of information in the student portal system. However, service quality, need to be improved as the relationship between service quality and satisfaction was found not to be significant. This is contrary to Lin (2007) and Chen & Cheng (2009) who found that service quality affected user's satisfaction. However, this finding is consistent with Chao- Min Chiu & Chang (2007). A possible explanation for the insignificant relationship could be that the service provided in the context of student portal is still inadequate. This may be due to a lack of staff experienced in dealing with system. Therefore, the organization must provide adequate training to the IT staff members.

### *Limitations*

There are some limitations to this study that should be noted. First, the results are not generalizable because current study examined only one student portal system. Second, the data are cross-sectional while individual's intention to use student portal system is continuous process. Third, although the model explains 48% of the variance in continuance intention and 67% of the variance in satisfaction, it does not include several others construct existed in the literature. Further studies could include educational compatibilities and technological expectancy (Chen , (2011) on continuance intention

## CONCLUSION

Meeting customer expectations of IS quality is accomplished by offering appealing, user-friendly interfaces, entertaining user requests for changes, and satisfying the stakeholders of the IS

(Somers & Somers, (2010). The above statement shows the importance of protecting the quality of the IS system. As has been proven in this study, satisfaction of the students towards portal system is the key to the success of the implementation of student portal system. In order to gain students satisfaction, factors that lead to students' satisfaction must be well explored.

Particularly, to satisfy student expectancy on service quality, organization should focus on enhancing staff abilities in dealing with the portal system by providing better enhancement courses. Student can therefore receive better service quality.

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