Evaluating Factors Affecting User Satisfaction in University Enterprise Content Management (ECM) Systems

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Abstract: Higher learning institutions (HLIs) are implementing enterprise content management (ECM) systems as web portals that are helping them interact with and serve their students better. However, there is a paucity of research that has evaluated the factors that account for students using their university's portals. As a case study and using the D&M IS Success Model as a guiding lens, this paper explored the factors that influence Limkokwing University of Creative Technology (LUCT) Students to use the university's portal through a survey. Data was collected from 134 students through Stratified Random Sampling technique that was analysed through Partial Least Square - Structural Equation Modelling (PLS-SEM). Results obtained show clearly that LUCT students are using the university's portal as a result of the System Quality and Information Quality which gives them Satisfaction. However, the findings reveal no significant correlation between Service Quality and Satisfaction of the students as well as the System Quality and Behavioural Intention (BI) to use the Systems. This study has given more insights into LUCT Management, Administrators, and Faculties concerning how to handle their Students need. Other implications for both practice and theory were also discussed.

Keywords: LUCT, Enterprise Content Management (ECM), Portals, DeLone and McLean (D&M) IS Success Model, Students' Satisfaction, Intention to use

1. Introduction

Higher learning institutions (HLIs) are implementing Enterprise Content Management (ECM) systems as web portals that are helping them interact with and serve their customers better. This has been made possible as a result of the emergence and maturity of the web 2.0 technologies. ECM is defined as "an enterprise-wide integrated approach to managing an organisation's documents, email, reports, web pages, intranets, extranets, portals and other digital assets" (Paivarinta, Salminen, and Tyrvainen, 2004; Scott, 2011; Smith and Mckeen, 2003). Scott (2011) listed the following benefits accruing to organizations that implement ECM systems: "(1) better decision making and increased efficiencies from enriched information sharing and collaboration; (2) compliance control; (3) lower web publishing costs; and (4) 're-usability' of the content for multiple media".

In HLIs, ECM systems are usually integrated with Learning Management Systems (LMS) and implemented as a form of Web Portals that can be a one-stop shop for Administrators who upload Lecture Time Tables, Exams Time Tables, News, Announcements, Tuition, and Accommodation etc. Lecturers also upload their Course Outlines, Lecture Notes, Tutorials, Assignments, and Examination Results and so on. Students, likewise, can log in to such portals and are able to download their lecture materials, submit assignments, check their examination results, and check their tuition balance etc. In so doing, there are constant interactions between Lecturers, Students, and University Administrators, which results in cohesion and can lead to improved customer satisfaction and organisational performance.

Scott (2011) stated that although "contemporary ECM systems employ Web technologies which deliver multiple media through navigation and a friendly user interface" yet, there exists little research on user perceptions as the user viewpoint on ECM has been largely neglected, even though implementation will not succeed without user acceptance of the technology. A critical look at the ECM literature has revealed that very few studies have looked at the influencing factors that made organisations adopt it. For example, a study by Alalwan and Weistroffer (2012) entitled "Enterprise content management research: a comprehensive review" revealed that most of the papers under ECM have focused on theoretical, descriptive, case studies, decision

sciences, archival with very few surveys. Even so, the surveys were done in businesses other than HLIs. However, little research has been done to establish the effectiveness of ECM systems in the context of HLIs to ascertain if there is a significant impact on Students learning and research. Yet, ECMs have been implemented and is used in many HLIs (Sugandi and Kurniawan, 2019). An example is the Limkokwing University of Creative Technology (LUCT), Cyberjaya, Malaysia that is being used as a case study and for the survey of this study. The university has implemented an ECM system for their operations that are being used by Senior Management, Faculty, Staff, and Students for their daily interactions.

The fundamental motivation behind this study is borne out of the paucity of studies that have explored the factors that account for Students to use ECM systems in HLIs. Consequently, the primary objective is to examine the factors that account for Students to use the LUCT Portal. Knowing this will aid management of the university to make an informed decision concerning the academic success and growth of the university.

1.1 Background of LUCT ECM System

LUCT's website is an award-winning site that incorporates the Student Portal Content Management System (CMS). It receives over 222 million hits yearly (University, 2018). The LUCT Student Portal was developed in 2009 to improve teaching delivery and Students' experience. Upon successful registration as a sophomore, all Students are required to log in and activate their portal to assess several academic/learning contents. Over 30,000 students from 165 countries on its campuses worldwide are assessing several contents via the Students' Portal's Dashboard on a daily basis (University, 2018). The contents of the portal include more than 5000 module files from 120 (95 undergraduate and 25 postgraduate) programmes across nine faculties. The module file contents uploaded into the Students Portal include slides, assignments, module outline, tutorials and so on. The Student portal also avails the Students with other material such as; class schedules, real-time chat with instructors, exam timetable, exam reminders/notification, attendance record, visa renewal notification/reminders, course fee advice, course registration, checking of examination results, eLibraries, counselling amongst other things.
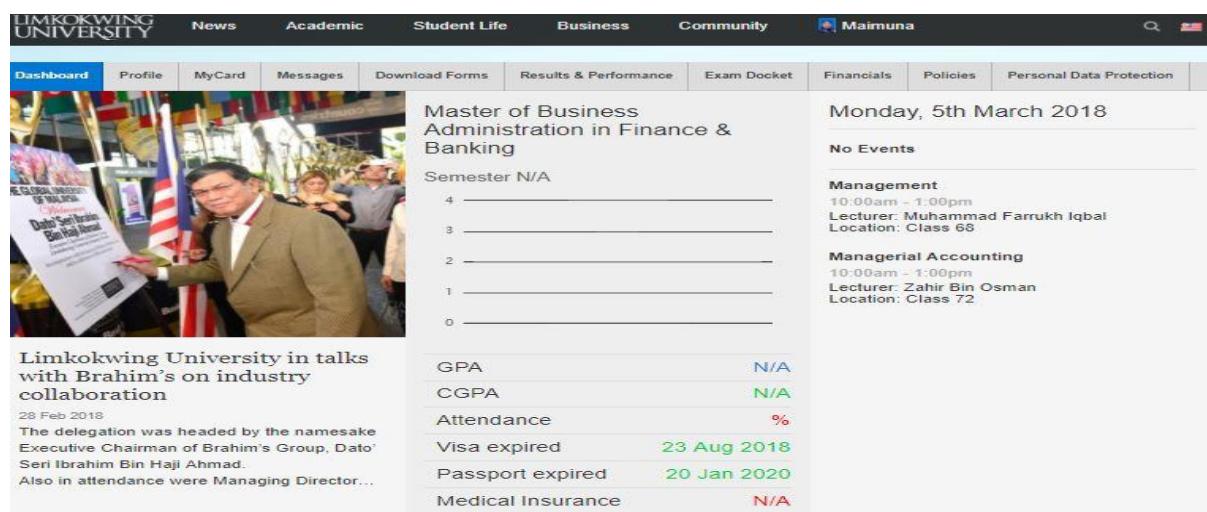
Figure 1: Screenshot of the Student Portal

This study thus explores the implementation success of LUCT ECM (Figure 1) which attracts students to continue utilising the system.

The subsequent part of the paper is presented as thus: the next section details the literature review comprising of the theoretical framework, related studies and conceptualisation of the study constructs. The methodology follows with the survey instrument used, data collection and sampling technique adopted, and data analysis methods used. In the subsequent section, the researchers discuss the details of the findings, with implications, suggestions for future studies, limitations, and lastly conclusion following.

2. Literature Review

2.1 The concept of ECM

ECM has gained much attention over the years in both academia and practice. This evidence points to the fact that almost every organisation from small, medium to large have implemented one form of ECM or the other for the dissemination of information to the general public about their brand as well as for their internal operations. While several definitions exist for ECM, however, there seems to be a consensus among scholars as all of them points to the general concept of ECM processes alluding to the same activities involved in its implementation and usage.

According to the ECM Association (AIIM International), ECM is defined as "the strategies, methods and tools used to capture, manage, store, preserve, and deliver content and documents related to organisational processes". They continued further that "ECM tools and strategies allow the management of an organisation's unstructured information, wherever that information exists ([www.aiim.org)](www.aiim.org)". Smith and Mckeen (2003) however, defined ECM as "the strategies, tools, processes and skills an organisation need to manage all its information assets regardless of type over their lifecycle." Gartner emphasised that ECM "includes the following core components: document management, web content management, records management, document imaging, document-centric collaboration, and workflow"(Alalwan and Weistroffer, 2012, p. 422). Munkvold et al. (2003, p. 71) also defined ECM as "the technology that provides the means to create/capture, manage/secure, store/retain/destroy, publish/distribute, search, personalised and present/view/print any digital content". Many scholars see ECM as the advancement of "document management, records management, workflow (business process) management, and web content management systems (CMS) that started in the 1980s" (Alalwan and Weistroffer, 2012).

In spite of the diversity of definitions for ECM, the fact remains that it is all about development and dissemination of content which can come as documents and their management, web content management, records management among others. These are done through the five main components of ECM which includes: capture, manage, store, preserve and deliver. **Capture** involves information creation through the conversion of paper documents into electronic formats, acquiring and accumulating electronic files into a cohesive structure, and organization of information. Such information can include students' biographies, students' grades, contracts, invoices, research reports and so on. The **Manage** component involves the connection, modification and employment of information via means such as collaborative software, document management, records management and web content management. The **Store** component involves momentarily backing up frequently varying information in the short term within flexible folder structures to allow users to view or edit information. The **Preserve** component involves the backing up of infrequently varying information in the medium and long term and is normally achieved through records management elements. This is usually used to help organizations conform with government and other regulations. The **Deliver** component involves providing end users and clients with requested information (Munkvold et al., 2013).

Some of the benefits in the literature about ECM that have caught the attention of organizations include: ECM being viewed as "an evolution of information management that involves the management of structured and unstructured content through the complete content lifecycle" (Boiko, 2005) and ECM allowing "organizations to simplify heterogeneous data and process structured, and unstructured information" (O'Callaghan and Smits, 2005). Again, ECM enables organizations to build content about the organization's brand and culture which is not only for their employees' internal use but also for their customers and other stakeholders. Thus, information that for instance requires a customer to visit an office of the organization can now be obtained online with a click of a button when he/she visits the company's website and is authenticated with a valid account.

There is a growing body of literature that recognizes the importance of ECM. In a study by Pate et al., (2018), the researchers analysed a case and offered insight or process intervention within the ECM system called support phases. The support phases are an integral part of the success of ECM.

In contrast to their findings, however, no evidence was detected, in a study of e-government implementation of ECM in Africa, Rwanda specifically (Bakunzibake, Grönlund, and Klein, 2016). Their study, which utilised the

Horne and Hawamdeh framework used 56 informants employing a semi-structured interview, found that the users do not see the benefits of ECM as the project management plan is not clear. By contrast, the effectiveness of the ECM technique has been stressed in an editorial by (Tyrväinen et al.,, 2006). They also offered a framework for successfully implementing ECM and reiterate that the ECM system provides a vital and critical subfield of Information System. Likewise, Mohamad et al. (2018) investigated the antecedents of ECM benefits. The authors categorised the benefits drivers into three (technological, organisational and environmental).

The implementation of ECM occurs in several stages which include the following: "Capture", "Organize", "Process" & "Maintain" (Smith and Mckeen, 2003), while (Gupta, Govindarajan, and Johnson, 2001) presented three distinctive stages namely: Storage, Delivery and Creation.

Selected papers of ECM publications over the years are presented in Table 1:

Table 1: Selected ECM papers

Article	Theory	Country/Region	Sample and methodology
Pate et al. (2018)	Conceptual	North America, Europe, Asia Pacific	Case study
Bakunzibake et al. (2016)	Conceptual	Rwanda	Semi-structured interviews with 56 people
Tyrväinen et al. (2006)	Conceptual		Editorial
Ngulube (2018)	Conceptual	South Africa	Quantitative data collected through questionnaires supported with observation and document/system analysis
Mohamad et al. (2018)	Conceptual		Literature review
Scott (2011)	Theories on knowledge management, computer self-efficacy, technology acceptance and cognitive engagement inform this study on users' perceptions of an ECM system		Online questionnaire
Enríquez, Domínguez-Mayo, García-García, and Escalona (2017)	Conceptual	Spain	Case study

As outlined in Table 1, although the ECM literature has seen a lot of attention from academia, unfortunately, most of these studies have been conceptual without robust underpinning theories. Also, there is a lack of robust statistical analysis with regards to those with surveys as most of the analysis have been done through descriptive statistics. In the case of HLIs, there is no mention of ECM implementation and their impact on teaching and learning. This study thus aims to fill this gap by using the updated Delone and Mclean Information Systems Model supported with strong statistical analysis (structural equation modelling (SEM)). The next section discusses the underpinning theory for this study.

2.2 Theoretical background

The underpinning theory for this study is the DeLone and McLean Information Systems (IS) Success Model. In the year 1992, DeLone and McLean created a model to analyse the efficacy of Information System success in an organisation. Also known as 'D&M IS success model', the model entails of six variables: user satisfaction (uSat), information quality (infQual), use, individual impact (iImpact), system quality (sysQual), and organisational impact (orgImpact). A decade later, due to evaluations, contributions, reviews and suggestions by likeminded researchers (Seddon, 1997; Seddon, Kiew, and Patry, 1994), the authors updated the model by introducing new constructs and removed others. The updated model introduced the servQual construct, which echoed the need for measuring support in information system implementation. To measure users' attitude,

intention to use was introduced replacing the Use construct. Finally, the authors merged Individual Impact and Organisational Impact as a new variable named 'Net Benefits'.

D&M model has repeatedly been used in several fields of studies, for instance; digital libraries (Vemuri et al., 2006), E-government (Hussein, Karim, and Selamat, 2007), Online Learning Systems (Lin, 2007; Weli, 2019) and Campus portal system (Masrek, 2007; Naveed and Ahmad, 2019). Furthermore, the model serves as the foundation for other renowned theories; for instance, the Knowledge Management System (Wu and Wang, 2006) and the Enterprise System Success Measurement Model (Sedera, 2006).

Therefore, the researchers partially adopted constructs from both versions of the Information System Success Model to evaluate Students' intentions to use ECM System. In the projected research, we are aiming to investigate and substantiate how two of the three quality dimensions -infQual and servQual- could influence the Students intention to use the University's portal. Furthermore, the users' satisfaction construct was used to evaluate its influence on the Student's intention to use the portal. The research model is presented in Figure 2.

The D&M model has been widely used in the context of educational information systems. A recent study by Yan et al., (2014) on evaluating the quality of online libraries and virtual communities found that Students perceived a greater level of quality of digital libraries than of virtual communities. Their study found the quality issue to be the most vital factor for success. The portal of five Universities in Jordan was analysed in a study by Shaltoni et al., (2015) and found a substantial influence of the availability of service and quality on Students' satisfaction with the system. In Africa, Lwoga (2013) used the model to test the intention to reuse web 2.0 system. In Asia, D&M was used by Cheng (2014) to evaluate users' intentions concerning eLearning systems where the observation of 85% variance was reported. The D&M IS success model, and the technology acceptance model (TAM) by (Davis, 1989) were merged in a study by Chen and Chengalur-Smith (2015) and found a positive correlation between sysQual, infQual and servQual and Students' satisfaction. Similarly, another study by Chen (2015) which merged the D&M IS success model, and TAM was conducted to assess the satisfaction of Students' with an ECM.

2.3 Conceptual Development
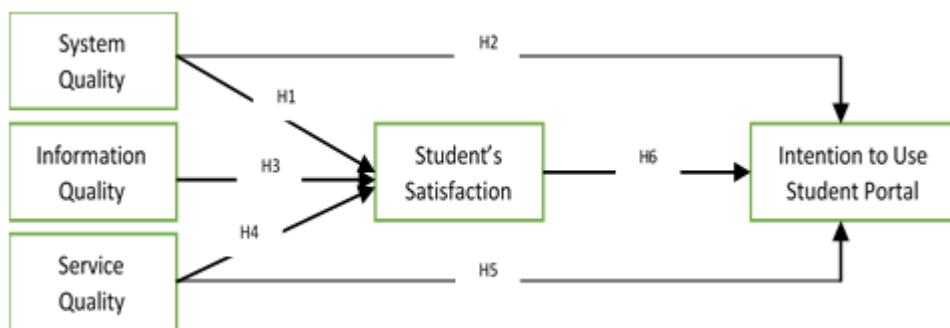
Figure 2: Research Model

2.3.1 The link between System Quality, User Satisfaction, and Intention to use

According to a definition provided by (Al-Samarraie et al., 2017, p. 5; Davis, 1989; Doll and Torkzadeh, 1988; Rai, Lang, and Welker, 2002) System Quality "refers to the extent to which systems are 'user-**friendly'** and can be used without any particular hassles." System Quality measures the extent to which the system is technically sound (Gorla, Somers, and Wong, 2010). Seddon (1997, p. 246) added that "System Quality is concerned with whether there are bugs in the system, the consistency of user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of program code."

The quality of the System is measured by functionality, ease of use, reliability, data flexibility, integration and quality dimension (DeLone and Mclean, 2003).

A strong relationship between System Quality and intention to use the system has been reported by prominent researchers. Looking at the researchers that use D&M in an educational context, Cheng (2014), reported a strong positive relationship between System Quality and Behavioural Intention (BI) as users are

profoundly attached to the qualitative system. Likewise, recent studies (Chen, 2015; Chen and Chengalur-Smith, 2015) found that System Quality is positively related to User Satisfaction and behavioural usage intentions with regards to using a learning system. Again, studies from (Lwoga, 2013; Rana et al., 2014), obtained similar positive result. Thus, the researchers postulate that the quality of the system will influence the Students' satisfaction and intention to use the system.

Hence, it is hypothesised that:
H1: System Quality positively affects the Students' satisfaction using the LUCT portal.

H2: System Quality positively affects the Students' intention to use the LUCT portal.

2.3.2   The link between Information Quality, User Satisfaction, and Intention to use

Since the definition of information quality differs among researchers, it is important to clarify its meaning. According to DeLone and McLean (1992), Information Quality refers to "the quality of outputs the information system produces which can be in the form of reports or online screens." A further definition of Information Quality was given by Negash et al. (2003) as cited by Alzahrani, Mahmud et al., (2017) who defined Information Quality as "the system's output value, as perceived by the respective user of the system." The quality of information is usually measured by completeness, accuracy, relevance, consistency, and timeliness (Alzahrani et al., 2017). A substantial factor that leads users to believe in the usefulness of an Information System is the quality of the information. When users perceived the value of the system, the chances to use the system become higher than when they believe the information is vague, erroneous, incomplete, and outdated (Lin and Lu, 2000). Information Quality has been measured by (Huh et al., 1990) via four dimensions: currency, accuracy, completeness, and consistency. The studies have explored the relationships between Information Quality, User Satisfaction, and Intention to use. The IS literature suggests that Information Quality has an effect on User Satisfaction and intention to use (DeLone and McLean, 2004; Park and Kim, 2006; Wixom and Todd, 2005).

More recent studies for instance; (Lin, 2007; Lin, 2007), (Yun, Kettinger, and Lee, 2012), (Lwoga, 2013), (Shaltoni et al., 2015) and (Eom et al., 2012) have found a significant relationship between information quality and User Satisfaction or Intention to use online learning system.

Thus, the researchers maintain D&M's original hypothesis and project that users' satisfaction and behaviour are both influenced by Information Quality. It is therefore hypothesised that:

H3: Information Quality positively affects users' satisfaction with the LUCT Student's portal.

2.3.3   The link between Service Quality, User Satisfaction, and Intention to use

The term Service Quality was defined by Ahn, Ryu, and Han (2004) as "users' subjective assessment that the service they are receiving from the portal is the service they expect". This definition is similar to that of (Bharati and Berg, 2003; Gorla, Somers, and Wong, , 2010, p. 213) who defined Service Quality as "the degree of discrepancy between customers' normative expectations for service and their perceptions of service performance."

Empathy, competence, confidence follow-up service, responsiveness, and reliability are the dimensions used to measure Service Quality. Many other considerable amounts of literature have been published to measure Service Quality, for instance; SERVQUAL by Parasuraman, Zeithaml, and Berry (1988), which also led to the establishment of the SERVQUAL instruments. In the same vein, Cronin and Taylor (1994) presented the SERVPERF instrument that measures the user's perception of quality, as a valid measure of value.

In the updated D&M model by DeLone and Mclean (2003), the authors introduced the 'Service Quality' to the dimension of "quality" (Ramayah, Ahmad, and Lo, 2010). The introduced construct was proposed to measure the information system success considering the significance it has in information system support, particularly in the e-commerce context where the most crucial factor is offering best services to use (Chung, Skibniewski, and Kwak, 2009).

In the research by Masrek (2007), a strong correlation was found between Service Quality, User Satisfaction and Intention to use. This finding was supported by another study by (Lwoga, 2013; Shaltoni et al., 2015)

which found the same result. Likewise, the findings by (Chen and Chengalur-Smith, 2015; Cheng, 2014) supported the previous researchers by finding a significant link between the phenomenon discussed.

Several studies in the educational context, have found a significant relationship between Service Quality and Students Intention to use the Student portal. Some of these studies include those in the field of library science, for instance, digital library success (Alzahrani et al., 2017), eLearning (Eom et al., 2012; Ramayah et al., 2010; Ramayah and Lee, 2012).

The evidence presented in this section suggests that the higher level of Service Quality leads to higher level of user intention and satisfaction. Hence, it is hypothesised that:

H4: Service Quality has a positive relationship with the Student's satisfaction with the LUCT Student's portal.

H5: Service Quality has a positive relationship with the Student's intention to use the LUCT Student's portal.

2.3.4   The link between User Satisfaction and Intention to use

According to Al-Samarraie et al. (2017, p. 6) and Seddon and Kiew (1996), the term user satisfaction is "a pleasant or unpleasant user feeling associated with the advantages the person had hoped to achieve as a result of interacting with the information system". In the same vein, user satisfaction was defined by Doll and Torkzadeh (1988) as "the way users feel in regards to utilising certain computer applications. These feelings are closely linked to how helpful the system was in addressing all the needs of the client." Apart from their definition, (Doll and Torkzadeh, 1988) further proposed and established User Satisfaction instrument known as End User Computer Satisfaction (EUCS).

Similarly, Chiu et al., (2005), Ramayah and Lee (2012, p. 198), refers to User Satisfaction "as an individual's feelings of pleasure or disappointment resulting from comparing a product's performance (or outcome) in relation to his or her expectations." As one of the significant measures of Information system success, User Satisfaction is broadly recognised as an antecedent of any service or product experience. User satisfaction is used in IT/IS studies to evaluate and investigate a service or product and to forecast its consequences behaviourally (Ramayah and Lee, 2012).

Many previous studies have explored the relationships between User Satisfaction and Intention to use and found a strong positive correlation between satisfaction and behavioural intention (Oliver, 1980; Ramayah and Lee, 2012). A study by Bhattacherjee (2001) analysed the use of online banking services and found a significant relationship between satisfaction and Information system continuance. Similarly, Van Riel et al. (2001) established that satisfaction has a substantial effect on the intention to continue using a portal. Users' continuance intention is determinant of satisfaction (Roca, Chiu, and Martínez, 2006).

User Satisfaction is well-thought-out as one of the critical success proportions of the success of Information System (Alzahrani et al., 2017). According to DeLone and McLean (1992), User Satisfaction and behavioural intention to use the system are highly interrelated.

In an educational context, studies by Cheng (2014), in analysing user experience, found that when users are satisfied, they are invigorated to reuse the system. By contrast, a similar relationship was attained in previous works by (Ismail et al., 2012; Lwoga, (2013). The Satisfactions users achieve from the quality of a system, information, and service are likely to escalate users' intention to use the system (Alzahrani et al., 2017).

All of the studies reviewed here support the hypothesis that User Satisfaction affects BI. Hence, the researchers hypothesised that:

H6: User Satisfaction positively affects the behavioural intention of the Students towards LUCT portal.

2.3.5   Behavioural Intention

Intention to use was used in the updated D&M model by DeLone and Mclean (2003), to test the behavioural Intentions of users. The behavioural intention is represented by the construct "intention to use" which serve as an antecedent for use (Mardiana, Tjakraatmadja, and Aprianingsih, 2015). Several studies, especially those conducted using TAM have analysed the underlying factors of BI, for instance; (Baker-Eveleth and Stone,

2008), (Jackson and Chow, 1997), (Lu and Chiou, 2010; Lu, Kuo, and Lee, 2010) and (Ceccucci, Peslak, and Sendall, 2010). BI is also measured using several established antecedents, for instance, perceived ease of use (PEU) and perceived usefulness (PU).

Intention to use is a vital construct that suggest that a student will not use the system psychologically if he/she does not have the intention to use beforehand (Mardiana et al., 2015). The theoretical backing underpinning this assumption is based on the Reasoned Action Theory (TRA) by (Fishbein, 1975).

3.   Research Methods

3.1 Data Collection and Sampling

The target population for the study are active students from Limkokwing University Cyberjaya Campus. The Student population is Seven thousand from which the G-power software (Erdfelder, Faul, and Buchner, 1996) was employed to determine the minimum sample size required for the study. For a four-predictor model, the minimum sample required was 74. However, this figure was doubled to cater for nonresponse bias and unusable or unengaged responses. Therefore, data were collected from 138 Students from LUCT using a Structured Questionnaire from extant literature, with little modification to suit the current needs. From the 138 questionnaires distributed, 132 were usable, representing a 97% response rate. Since a list and number of Students per faculty was available, a probability Stratified Random Sampling using faculty as a stratum was used. The questionnaires contain four sections with the first section requesting the demographics of the respondents. The second part elicited data on the respondents' experiences using the University's portal. Respondents were asked questions related to the predictor variables (SysQual, iQual, servQual, and uSat) in part three. Lastly, the fourth part catered for question-related to the dependent variable on continuance intention. All items were adapted from past studies (Hsu and Lin, 2010; Mayeh, Ramayah, and Popa, 2014; Venkatesh et al., 2003) and measured on a 5-point Likert Scale with "1=Strongly Disagree" and "5=Strongly Agree".

The Content validity of the survey instrument was carried out by two academic experts whose critical reviews and recommendation led to the removal of items deemed ambiguous. A pilot test analysing the reliability of the questionnaire was done with a sample of 30 respondents. All the emerging Cronbach Alphas were above the 0.7 thresholds denoting the instruments measuring the constructs were reliably acceptable.

4.   Data analysis and results

This research used the Statistical Package for Social Science (SPSS) version 23 to analyse the descriptive statistics of the respondent. Inferential statistics were achieved utilising PLS-SEM strategy employing SmartPLS 3.2.7 (Ringle et al., 2016). Data screening was carried out prior to the analysis to ensure the cleanliness of the data. The selection of PLS-SEM, in particular, the choice of using SmartPLS was attained from its capability to deal with small samples and data that is not distributed normally (Hair et al., 2014, p. 19). Therefore, the use of PLS-SEM method was reasonable with the small sample size of 138 respondents. Also, PLS-SEM has been used in most recent studies across different disciplines. For example, in Management Information System (Owusu, 2017; Owusu, 2019; Owusu, Ghanbari-Baghestan, and Kalantari, 2017; Owusu et al., 2017; Weli, 2019), and in Advertising and Marketing (Abdurrahaman and Osman, 2016; Abdurrahaman, Owusu, Soladoye, and Kalimuthu, 2018; Bakare, Owusu, and Abdurrahaman, 2017).

4.1 Demographic profile of respondents

The descriptive analysis (see Table 2) was performed to analyse the demographic profile of the respondents. The female Students (60.4%) outnumbered their male counterparts (39.6%) in this study. About 76% of the Students were aged 18-25 years. More than 42% of the Students that responded to the survey are taking degree courses.

As an internationally recognized University with students from over 165 countries, the race of the respondents was balance with Arabian (26.9%) leading, followed by Asian (25.4%), African (23.9%), European (14.2%) and other (9%). About 46% of the Students that use the LUCT Students' portal claimed they belonged to the frequent and extreme frequent users. Finally, about 41% of the Students used the portal for about 1-5 hours daily, while about 52% of them only visit the portal once a week or semester.

Table 2: Demographic Profile of respondents

Variable	Item	Frequency	Percentage (%)
Gender	Male	53	39.6
	Female	81	60.4
Age	18-25	102	76.1
	26-30	22	16.4
	31-34	10	7.5
Educational Level	Foundation	16	11.9
	Diploma	12	9
	Degree	56	41.8
	Masters	35	26.1
	PhD	15	11.2
Race	African	32	23.9
	Asian	35	25.4
	Arabian	36	26.9
	European	19	14.2
	Other	12	9.0
Frequency_of_Use	Extremely Frequent	10	7.5
	Frequent	52	38.8
	Neither Frequent nor Infrequent	3	2.2
	Infrequent	37	27.6
	Extremely Infrequent	32	23.9
Actual Portal Usage	Daily	10	7.5
	1-5 hrs/wk	52	38.8
	>5 hrs/wk	3	2.2
	ones/semester	37	27.6
	ones/wk	32	23.9

4.2 Evaluation of the Measurement Model

As a prerequisite of PLS-SEM using SmartPLS 3.2.7, all inferential statistics are completed in two phases (Hair et al., 2014). The assessment of the measurement model was executed in the first phase where the data had been subjected to confirmatory factor analysis (CFA) to authenticate their validity and reliability. Table 3 elucidates the outcomes of an evaluation of the measurement model. All the observed variables' outer loadings weighed beyond the acceptable threshold of 0.708. The reliability of the variables was evaluated via Cronbach alpha and composite reliability methods. Each method shows that the variables met the acceptable limit of 0.7 and above, hence reliable (Hair et al., 2014, p. 107; Nunnally, 1978). Furthermore, the convergent validity of the variables was assessed via the average variance extracted (AVE) criterion. The result shows that all the variables met the 0.5 and above threshold which is in agreement with the (Bagozzi, Yi, and Singh, 1991; Fornell and Larcker, 1981) guidelines.

To test for discriminant validity of the variables, the Fornell and Larcker (1981) criteria were used. According to Fornell and Larcker (1981), to achieve a discriminant validity, a construct's AVE should be greater than its correlation with all other constructs. In light of this, as shown in Table 4, discriminant validity has been established, as the figures in bold (square root of AVE) were all greater than the correlation with other constructs.

As regards to multicollinearity, all constructs with their indicators have VIF values below the acceptable threshold of less than 5 (Hair et al., 2014) as shown in Table 3. Hence no issue detected related to collinearity.

Table 3: Constructs Validity and Reliability

Constructs	Items	Internal Reliability (Cronbach Alpha)	Convergent Validity			R²	Variance Inflation Factor (VIF)
			Factor Loadings	Composite Reliability	Average Variance Extracted (AVE)		
System Quality	sysQual1	0.864	0.875	0.900	0.648	-	2.476
	sysQual2		0.837				2.531
	sysQual3		0.608				1.643
	sysQual4		0.920				4.061
	sysQual5		0.748				2.141
Information Quality	iQual1	0.814	0.802	0.870	0.576	-	1.821
	iQual2		0.604				1.466
	iQual3		0.808				2.421
	iQual4		0.661				1.640
	iQual5		0.885				3.445
Service Quality	ServQual 1	0.922	0.909	0.939	0.754	-	3.766
	ServQual 2		0.910				3.002
	ServQual 3		0.864				2.997
	ServQual 4		0.852				2.338
	ServQual 5		0.803				2.658
Intention to Use	IntToUse1	0.878	0.854	0.925	0.805	0.588	2.156
	IntToUse2		0.940				3.722
	IntToUse3		0.895				2.674
Student Satisfaction	uSat3	0.845	0.855	0.906	0.764	0.653	2.419
	uSat4		0.811				4.228
	uSat2		0.951				2.311

*uSat1, IntToUse4, IntToUse5 were deleted due to low loading

Table 4: Discriminant validity of Constructs

	Constructs	1	2	3	4	5
1	**Intention_to_Use Student Portal**	**0.897**				
2	**ServQual**	0.090	**0.868**			
3	**Students'_ Satisfaction**	0.766	0.100	**0.874**		
4	**iQual**	0.666	0.063	0.701	**0.759**	
5	**sysQual**	0.490	0.112	0.657	0.736	**0.805**

4.3 Assessment of the structural model

Having discussed the reliability and validity measurement model in the first part, the second part is evaluating the structural model by way of bootstrapping the hypothesised causal relationships. The result of the bootstrapping is analysed by evaluating the obtained t-values generated by SmartPLS 3.2.7. The result provides a statistical impact of the causative path correlation between the variables in the hypothesised model. As per (Hair et al., 2017, p. 171), in any PLS-SEM study, "the critical t values for achieving significance are; 1% (α = 0.01; two-tailed test), 5% (α = 0.05; two-tailed test) and 10% (α = 0.10; two-tailed test). The probability of error is 2.57, 1.96, and 1.65, respectively."

Figure 3 and Table 5 show the bootstrapped results for the structural model indicating the t-values of the causal correlations between the variables. At 5% significance level, (β= 0.141, t = 2.106) System Quality -> User Satisfaction; (β= 0.695, t = 10.688) Information Quality -> User Satisfaction; (β= 0.781, t = 10.571) User Satisfaction -> Intention to Use were significantly correlated. However, the path relationship from System Quality-> Intention to Use; Service Quality ->Student's Satisfaction, and Service Quality -> Intention to Use were insignificant as their t-values were all below the acceptable threshold of 1.96.
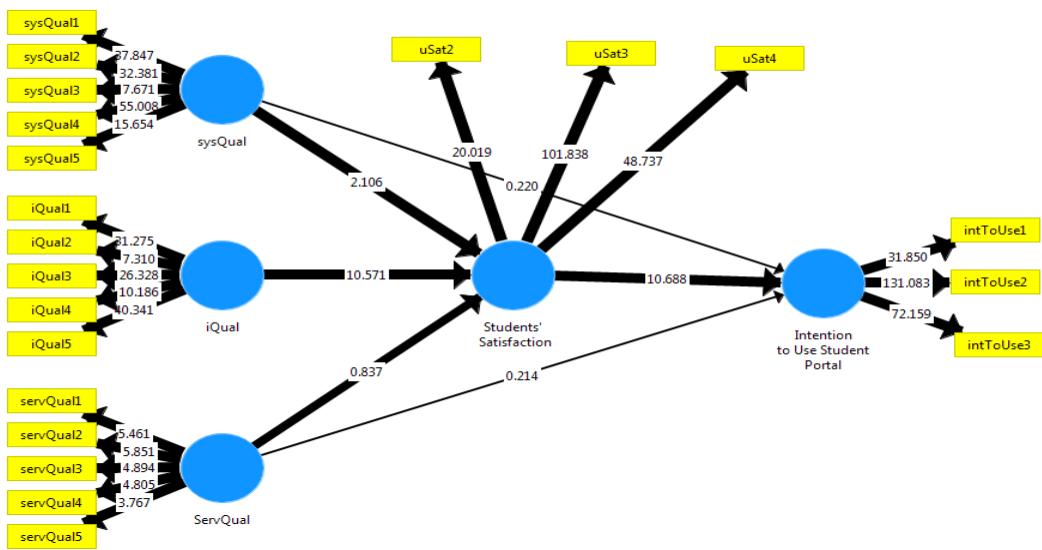
Figure 3: Bootstrapped results

Table 5: Bootstrapped result

Hypothesis	Relationships	t-values	p-value	Supported?
H1	sysQual -> Students'_ Satisfaction	2.106*	0.035	YES
H2	sysQual -> Intention_to Use Student_Portal	0.220(NS)	0.826	NO
H3	iQual -> Students'_ Satisfaction	10.571**	0.000	YES
H4	ServQual -> Students'_ Satisfaction	0.837(NS)	0.403	NO
H5	ServQual -> Intention_to Use Student_Portal	0.214(NS)	0.831	NO
H6	Students'_ Satisfaction -> Intention_to Use Student_Portal	10.688**	0.000	YES

NS=Not Supported, *p<0.05, **p<0.01

4.4 The coefficient of determination (R^2 value)

Denoted as R^2, the coefficient of determination in PLS-SEM analyses the model's prognostic precision. R^2 is calculated as "the squared correlation between a specific endogenous construct's actual and predicted value" (Hair et al., 2014, pp. 174). R^2 is the exemplification of all the independent variables' combined effects on the dependent variable. Furthermore, it is the aggregate of the variance in the dependent variable that is explained by all of the independent variables that are associated (Hair et al., 2014, pp. 174–175). As a benchmark, the R^2 have values stretching from 0 to 1.

From Table 3, the R^2 values of 0.653 denote that the System Quality, information Quality, Service Quality explain 65.3% of the variance in User Satisfaction. Likewise, User Satisfaction, System Quality and Service Quality can account for 58.8% of the variance on the dependent variable (intention to use). These results indicate that the model has a good predictive power on the target variable as all variables are above the threshold value of 0.26 recommended by (Cohen, 1988).

4.5 Effect sizes

The effect size is represented as f^2 and is used to measure an independent variable's significance on a dependent variable's R^2 value. Researchers use the f^2 value to estimate the prominence of each independent variable's influence in elucidating the variance of the dependent variable. As a rule of thumb, f^2 values of "0.02, 0.15 and 0.35 indicate an exogenous construct's small, medium or large effect, respectively, on an endogenous construct" (Hair et al., 2014, pp. 174–175). As obtained from Table 6, the f^2 values of 0.026, 0.637, 0.841, was achieved for the relationship between system quality, information quality, user satisfaction and intention to use. 0.001 and 0.005 indicating small/weak effect was obtained for the relationship between System quality, service quality with satisfaction and intention to use.

Table 6: R^2 and f^2 values

Constructs	R^2	Q^2	f^2 (Intention to Use)	f^2 (Student Satisfaction)
System Quality	-	-	0.001(Small)	0.026 (Small)
Information Quality	-	-	-	0.637 (Large)
Service Quality	-	-	0.001(Small)	0.005 (Small)
User (Students') Satisfaction	0.651	0.471	0.841(Large)	-
Intention to Use	0.588	0.446	-	-

4.6 Predictive relevance

According to Fornell (1994), a model should attain a Q^2 value higher than 0 to achieve predictive importance. As shown in Table 4, both Q^2 value for Student's satisfaction (0.471) and intention to use (0.446) were above Zero, which denotes that the model has adequate predictive relevance.

5. Discussion

This study sought to investigate the factors that led LUCT Students to continually use the LUCT Portal for interactions between Faculty, Administrators, and Students in their daily operations using the D&M IS Success Model as the underpinning theory. As hypothesised, results from the analysis revealed that there is a significant and positive relationship between LUCT Portal System Quality and User (Student) Satisfaction. However, there is no significant relationship between LUCT Portal System Quality and Intention to use LUCT Student Portal. Also, there is a significant and positive relationship between LUCT Portal Information Quality and User (Student) Satisfaction. However, there is no significant relation between Service Quality and User (Student) Satisfaction as well as Service Quality and Intention to use LUCT Student Portal. Lastly, there is a positive and significant relationship between User (Student) Satisfaction and Intention to use LUCT Student Portal.

The relationship between LUCT Portal System Quality and User (Student) Satisfaction (H1) emerged significant. This indicates that LUCT Students are delighted with the quality of the LUCT Portal. This may be due to its user-friendliness, ease of use in terms of navigating and locating the requisite information that a Student needs, reliability, data flexibility, and integration (DeLone and Mclean, 2003). This finding is inconsistent with other studies that found a significant and positive relation between System Quality and User Satisfactions (Chen, 2015; Chen and Chengalur-Smith, 2015; Lwoga, 2013; Rana et al., 2014).

However, the relationship between LUCT Portal System Quality and Intention to use LUCT Student Portal (H2) did not emerge significant. This significantthat there is no significant direct relationship between System Quality and Behavioural Intention to use LUCT Portal but instead through User Satisfaction. Thus, System Quality does not influence the Students' intention to use the LUCT Portal. This finding is inconsistent with the one found by (Cheng, 2014)

The hypothesised relationship between LUCT Portal Information Quality and User (Student) Satisfaction (H3) emerged significant. This means that Students of LUCT are highly satisfied with the Information Quality that the Portal offers which is seen as completeness, accuracy, relevance, consistency, and timeliness (Al-Samarraie et al., 2017). This is also shown in Table 5 with Information Quality having a large effect size (0.637) on User Satisfaction. The findings of this are in agreement with other similar studies (DeLone and McLean, 2004; Eom et al., 2012; Lwoga, 2013; Park and Kim, 2006; Shaltoni et al., 2015; Wixom and Todd, 2005; Yun et al., 2012)

The relationship between Service Quality and User (Student) Satisfaction (H4) as well as that of Service Quality and Intention to use to use LUCT Student Portal (H5) did not emerge significant in this study. This means that Students are not happy when it comes to the service delivery they get from LUCT, i.e. empathy, competence, confidence, follow-up service, responsiveness, and reliability may be lacking in the service delivery of LUCT. The findings of this are inconsistent with other studies (Al-Samarraie et al., 2017; Eom et al., 2012; Ramayah et al., 2010; Ramayah and Lee, 2012).

Lastly, the hypothesised relationship between User (Student) Satisfaction and Intention to use the LUCT Student Portal (H6) emerged significant in this study. This indicates that the satisfaction LUCT Students get from the Portal influences their Intention to use the LUCT Student Portal as shown in Table 5 with a large

effect size of (0.841). This finding is consistent with other studies (Al-Samarraie et al., 2017; Chen and Chengalur-Smith, 2015; Cheng, 2014; Ismail et al., 2012; Lwoga, 2013).

6. Conclusion

This study investigated the factors that led Students of LUCT to use the university's portal for their interactions with Lecturers, Administrators, as well as the University Management through the lens of D&M IS Success Model. The findings from the study have shown that LUCT Students are using the university Portal because of the System Quality and Information Quality from the Portal, which gives them satisfaction. This revelation has provided more insights to the LUCT Management, Administrators, and Lecturers as to what they should do to be able to attract and maintain Students in this globalised competitive world where Universities strive to attract Students.

This study has implications for both theory and practice. Theoretically, the use of D&M IS Success Model to predict the behaviour of Students to use a university ECM (Portal) has enriched the IS literature as most of the studies have not looked at it from the HLIs perspectives. Practically, there are many insights that this study has found. The following practical contributions are therefore made to the University Management, Administrators, and Faculty:

1. The results show that there is a positive correlation between LUCT Portal System Quality and User (Student) Satisfaction. This finding is a plus to LUCT, and thus the University Management should strive to maintain and if possible improve the System Quality of the Student Portal even further.
2. In addition, the results revealed a significant and positive relationship between Information Quality and User (Student) Satisfaction. Therefore, it is encouraged that LUCT Management should make it a daily effort to provide quality information to their Students.
3. Unfortunately, the findings revealed that there is no significant relationship between Service Quality and User Satisfaction as well as Service Quality and Intention to use to Use the Portal. Thus, LUCT Administrators, Faculty and Management should consider their customer service delivery. They should investigate where they fall short regarding their service delivery. Is it to do with their teaching and learning, library/eLlibrary, visa services, tuition, accommodation, etc.? Knowing this will help them improve on their service delivery, which in turn can make the Students satisfied, and thus continue to patronise their services and recommend them to other Students.

This study like many others has some limitations. This is a case study of only one University's ECM, and thus the findings cannot be generalised as it pertains to only one University in Malaysia. Future studies can do a survey involving several Universities in Malaysia and even beyond to ascertain the Students' behavioural intentions to use their university's portals.

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