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Critical success factors for adoption of web-based learning management systems in Tanzania

Edda Tandi Lwoga
Muhimbili University of Health and Allied Sciences, Tanzania

ABSTRACT

This paper examines factors that predict students' continual usage intention of web-based learning content management systems in Tanzania, with a specific focus at Muhimbili University of Health and Allied Science (MUHAS). This study sent a questionnaire surveys to 408 first year undergraduate students, with a rate of return of 66.7This study adapted the information system success (ISS) model, and it used structural equation modelling (SEM) for data analysis. The results show that quality-related factors (instructor and system) were a key predictor of perceived usefulness and user satisfaction, and that information quality was found to significantly affect perceived usefulness. Further, perceived usefulness was a key determinant of user satisfaction, which in turn predicted continual usage intention of students within the e-learning system under the analysis. The researcher's paper is among the few exploratory studies that examines constructs of IS success model in the e-learning systems in sub-Saharan Africa, and Tanzania in particular, and presents e-learning success factors that should be of value to higher learning institutions management, e-learning systems designers and providers, and instructors when planning and implementing e-learning projects in the region and beyond.

Keywords*: Web-based learning management system, e-learning systems, IS success model, Tanzania, Africa.*

INTRODUCTION

The rapid developments of information and communication technologies specifically Internet technologies have created new opportunities for education. E-learning holds immense potential to enable higher institutions of learning to enhance teaching and learning experiences, improve access to educational resources and programmes, expand educational opportunities via distance-learning, and reduce the costs of education in the long-term. E-learning is an "innovative approach to education delivery via electronic forms of information that enhances the learner's knowledge, skills, or other performance" (Siritongthaworn and Krairit, 2006:138). E-learning has various benefits, such as personalized learning, increased access to information, effective means to standardize and deliver content, on-demand content availability, interactivity, self-pacing and building confidence (Bhuasiri et al., 2012). It consequently provides flexible, convenient and diverse learning environments to meet the disparate needs of learners (Bhrommalee, 2012). The e-learning approach can open the knowledge pipelines which instil a culture of inquisitiveness and enquiry in students and graduates that is critical for life-long learning. As compared to conventional learning styles, e-learning can offer a time-effective approaches and potentially reduce costs for classrooms and facilities, training, travel, printed materials, and labour (Bhuasiri et al., 2012).

The adoption of e-learning systems is becoming popular in higher learning institutions across the world including African universities. As a key higher education institution that develops human resources for health in Tanzania, Muhimbili University of Health and Allied Sciences (MUHAS)

revised its curricular to introduce innovative teaching and assessment methods, and improved its ICT infrastructure to enhance its teaching and learning activities since 2000s. MUHAS developed its ICT infrastructure and services by carrying out the following: established the optic fiber Local Area Network (LAN), increased access to greater numbers of computers, developed an online library catalogue, digital repository, and student academic record system, and subscribed to over 40 academic databases. The university has also introduced the learning management system (LMS) which is based on Moodle open source software. Despite the investments and applications of ICTs at the university, this institution has made little gains with the acceptance and usage of e-learning systems for teaching and learning activities. Previous studies demonstrate that the introduction of e-learning technologies is often a difficult process and students and instructors will not always use it as predicted (Venter et al., 2012).

Some of the factors that affect the acceptance and usage of e-learning technologies in most institution in developing countries include the technological infrastructure, high cost of technology, instructional efforts, graduate competencies, technology satisfaction (Venter et al., 2012), management support, methodology, resource accessibility and availability, culture of education and learning styles, intellectual investment, design of assistive tools, and global business (Ndume et al., 2008). As demands for higher education and e-learning continue to expand in Africa, it is important to determine factors that influence the perceptions of students and faculty when using a specific e-learning technology. The success of an e-learning system relies on both its early adoption (acceptance) and its sustained usage (Tai et al., 2012). It is therefore important to understand the relevant factors that predict student's intention to continue using the e-learning system.

Various e-learning studies have been conducted in Africa, including the discussion of implementation or description of novel systems and their dissemination (Matti et al., 2010; Nagunwa and Lwoga, 2013; Rhema and Miliszewska, 2010), acceptance and adoption of e-learning (Adeyinka and Mutula, 2010; Eke, 2011; Farahat, 2012; Tagoe, 2012; Venter et al., 2012; Wambui and Black, 2008), ICT readiness and acceptance (Gombachika, 2013), and descriptive usage of learning management systems and other learning technologies (Czerniewicz and Brown, 2009; Lwoga, 2012; Nihuka and Voogt, 2012; Unwin et al., 2010). Nevertheless, few studies have evaluated e-learning systems to understand factors that determine continual usage intentions of e-learning systems among students in the African context, and Tanzania in particular. Furthermore, research shows that, "weight of the impact of these factors may differ for different user types and e-learning technology types" (Pušnik et al., 2011). It is imperative to understand the attitudes and continual usage intentions of e-learning systems among students in order to synchronize the university's strategic goals with the educational objectives of students, justify the ICT investments and optimize the use of technology. The user adoption and use of an information system such as e-learning is an important factor that predicts achievement or failure of the system (Farahat, 2012).

Therefore, this study sought to establish the determinants of students' continual usage intention of the web-based learning management system and to investigate how these determinants can shape the students' intention to use online learning at MUHAS. The Information Systems Success (ISS) model (Delone and Mclean, 2003, 2004) has received great attention in IS literature and provides a theoretical basis for investigating student's attitudes and continual usage intention of web-based learning management system in this study.

CONCEPTUAL MODEL AND RESEARCH HYPOTHESES DEVELOPMENT

Information system models and theories are commonly used in many studies that investigate determinants of the acceptance and usage of e-learning technologies. This study used

Information Systems (IS) success model of Delone and McLean (1992), and its extended model (Delone and Mclean, 2003, 2004) to better explain the acceptance and usage of e-learning system at MUHAS. The first version of the Delone and McLean's (1992) model has six major dimensions of IS success: system quality, information quality, use, user satisfaction, individual impacts, and organizational impacts. Delone & McLean (2002, 2003) further extended the model to include service quality as the third quality factor and intention to use and net benefits as new dimensions. The factor related to intention to use was added as an alternative measure of ''use because an attitude is worthwhile to measure in some context" (Delone and Mclean, 2004).

Several studies on e-learning acceptance have made attempts to modify and/or re-specify the Delone and McLean (2003; 2004) model. For example, Adeyinka and Mutula (2010) re-specified the IS model to evaluate the effectiveness of WEBCT systems in educational setting at the University of Botswana. The study concluded that content quality, system quality, support service quality, teaching and learning quality, self-regulated learning, intention to use/use, user satisfaction and net benefits were important factors for evaluating the success of WebCT content management systems. Based on the expectancy disconfirmation theory (EDT) and IS success model, Roca et al (2006) proposed a decomposed technology acceptance model in the context of an e-learning service. The study found that users' continuing intention to use e-learning system was determined by satisfaction, which in turn is jointly determined by perceived usefulness, information quality, confirmation, service quality, system quality, perceived ease of use and cognitive absorption.

The recent works of Cheng (2012) used IS success model and Technology Acceptance Model (TAM) (Davis, 1989) to investigate the acceptance and continual usage intention of e-learning system in eight high-tech companies in Taiwan. The study found that information quality, service quality, system quality, and instructor quality influenced employees' perception about their beliefs (i.e. perceived usefulness, perceived ease of use, and perceived enjoyment), and this situation can further enhance employees' usage intention of the e-learning system (Cheng, 2012). Chen (2010) moreover examined the relationship between e-learning systems use and overall job outcomes based on the IS model in Taiwan. The study established that quality factors (information and system) had significant relationship with perceived usefulness, and that system quality has a significantly positive association with user satisfaction. Further, both perceived usefulness and user satisfaction influenced system use, and the overall job outcome.

Seddon (1997) re-specified IS success model of Delone and Mclean (1992), and proposed the relationship between the process and variance models in the original IS success model. Seddon (1997) replaced the IS use factor with four new variables: expectations, consequences, perceived usefulness, and net benefits to society. Seddon (1997) proposed that higher level of expectations about the net benefits of future IS use, (henceforth expectations) will lead to higher levels of IS use. The system use construct was placed outside a revised model of system success because it was deemed as a characteristic of user behavior more than a measure of system success. The construct of perceived usefulness reflects users' perceived value of information system, and it indicates the possibility of other constructs to improve the use of the system through perceived usefulness and user satisfaction (Seddon, 1997). Other scholars moreover argue that the measures of actual use (both observed and self-reported) need respondents to have some experience with the technology (Pynoo et al., 2011; Šumak et al., 2011). Hence, other measures of technology acceptance, such as perceived usefulness and intention to use may be used in the planning or initial stages of implementing technologies (Pynoo et al., 2011; Šumak et al., 2011).

Other information systems studies (Floropoulos et al., 2010; Landrum and Prybutok, 2004) moreover re-specified the IS success model (Delone and Mclean, 2004; Seddon, 1997), into five constructs: information quality, system quality, perceived usefulness, and user satisfaction. The models proposed that quality factors (i.e. information, system and service), influence both

perceived usefulness and user satisfaction (Floropoulos et al., 2010; Landrum and Prybutok, 2004).

This study adopted the Delone and McLean's (2004) extended model, and the re-specified IS success models developed by various scholars (Chen, 2010; Cheng, 2012; Floropoulos et al., 2010; Landrum and Prybutok, 2004; Seddon, 1997) to examine the success of e-learning systems in the Tanzanian's higher education context. In this study, success measures (e.g., instructor quality) were added to the Delone and Mclean model (2004) to suit the educational context of the study. Instructor quality (that is, instructor attitude towards e-learners) has been proven over the years that it has a significant relationship with the perceived usefulness of the e-learning system (Cheng, 2012; Lee et al., 2009). Since the e-learning system has just been introduced at MUHAS, the actual use of e-learning systems in this study shall be predicted by perceived usefulness, user satisfaction and continual usage intentions as suggested in the literature (Seddon, 1997; Šumak et al., 2011). Therefore, this study proposes that perceived quality as operationalized by the four dimensions of information quality, system quality, service quality, instructor quality have significant association with perceived usefulness and user satisfaction, which in turn have a positive relationship with continual usage intention of web-based learning management system as shown in Figure 1.

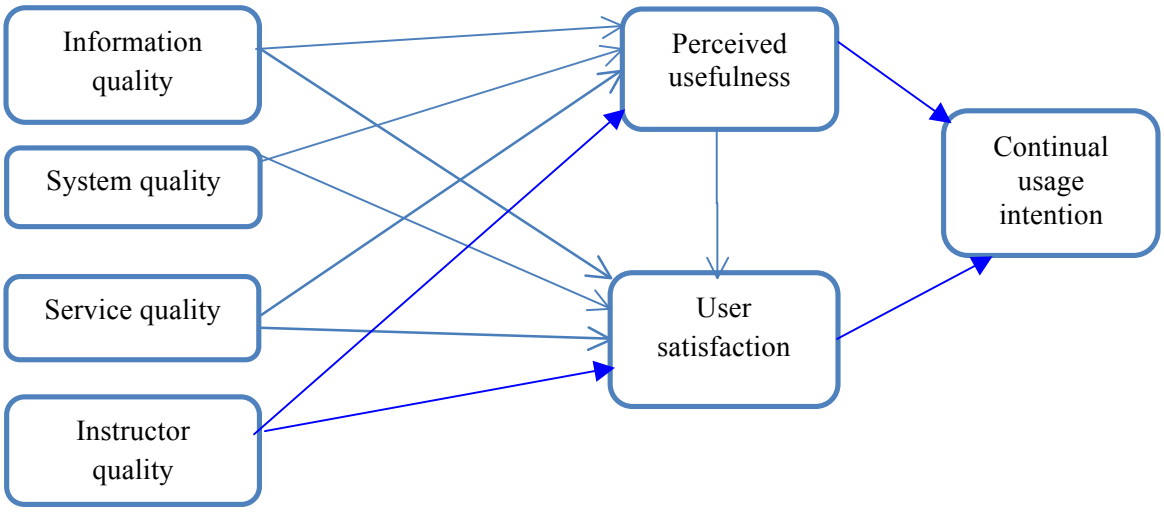


Figure 1: *Research model for the study*

Information quality (InfoQual)

Information quality in this study referred to the quality of course content delivered through the course management system. Course content quality is the, "judgment by (the students) of the degree to which course content management systems are provided with valuable content, concerning the defined needs of the students" (Adeyinka and Mutula, 2010). Measures of information quality includes personalization, completeness, easy to understand, security, timeliness, availability, relevance, and format of course contents delivered through the e-learning systems. Previous studies have shown that information quality has significant positive impacts on perceived usefulness of e-learning systems (Chen, 2010; Cheng, 2012). Besides, research demonstrates that information quality has significant positive effects on user satisfaction of e-learning systems (Ramayaha and Leeb, 2012; Roca et al., 2006; Wang and Chiu, 2011). Thus,

the quality of course contents may be important reason for students to perceive the usefulness of e-learning systems and to have higher levels of satisfaction with using e-learning systems. Hence, the study posed the following hypotheses:

H1: Information quality has a significant positive relationship with perceived usefulness of e-learning systems

H2: Information quality has a significant positive relationship with user satisfaction of e-learning systems

System quality (SysQual)

In the context of this study, the system quality measures the desired characteristics of the e-learning system. The metrics for system quality include responsiveness, usability, availability, reliability, and adaptability (Delone and Mclean, 2004). Prior studies show that system quality is a significant predictor of perceived usefulness of e-learning system (Chen, 2010; Cheng, 2012). Consequently, system quality was a significant determinant of user satisfaction of e-learning system in various studies (Chen, 2010; Ramayaha and Leeb, 2012; Roca et al., 2006). Thus, the more that students believe the web-based learning management systems will be reliable, available, and easy to use, the more they will use it. Hence, the study posed the following hypotheses:

H3: System quality has a significant positive relationship with perceived usefulness of e-learning systems

H4: System quality has a significant positive relationship with user satisfaction of e-learning systems

Service quality (ServQual)

Service quality refers to the overall support provided by the service provider, such as the ICT department, or specific unit in an organization, or outsourced services (Delone and Mclean, 2004). In this study, service quality refers to the support delivered by ICT technical staff. Measures for service quality include responsiveness, effectiveness and availability of technical support personnel (Delone and Mclean, 2004). Cheng (2012) found service quality as a useful determinant of perceived usefulness in e-learning systems usage. Consequently, various scholars showed that service quality significantly predicted user satisfaction of e-learning systems (Ramayaha and Leeb, 2012; Roca et al., 2006; Wang and Chiu, 2011). Hence, the study proposed the following hypotheses:

H5: Service quality has a significant positive relationship with perceived usefulness

H6: Service quality has a significant positive relationship with user satisfaction of e-learning systems

Instructor quality (InstQual)

Instructors are important people for shaping learners' behaviour in the e-learning course, and thus their attitude may affect learners behaviour (Cheng, 2012). Metrics of instructors quality include instructor's response timeliness, teaching style, and explanation/help towards learners through the e-learning system (Cheng, 2012). Prior studies found that instructor attitude towards e-learners had a significant positive relationship with perceived usefulness of the e-learning system (Cheng, 2012; Lee et al., 2009). Hence, the study proposed the following hypotheses:

H7: Instructor quality has a significant positive relationship with perceived usefulness of e-learning systems
H8: Instructor quality has a significant positive relationship with user satisfaction of e-learning systems

Perceived usefulness (PU)

Perceived usefulness is a "a perceptual indicator of the degree to which the stakeholder believes that using a particular system has enhanced his or her job performance, or his or her group's or organization performance" (Seddon, 1997). In this study, perceived usefulness relates to the degree to which the students believe that using the e-learning system shall improve their learning performances. Several scholars have acknowledged the strength of the perceived usefulness factor in determining the continual usage intention in technology acceptance studies (Pušnik et al., 2011; Venkatesh et al., 2003), and e-learning systems studies (Cheng, 2012; Lee et al., 2009; Lee, 2010; Lin and Wang, 2012; Venter et al., 2012). Besides, prior studies show that perceived usefulness has significant impacts on user satisfaction of e-learning system (Chen, 2010; Lin and Wang, 2012; Roca et al., 2006; Seddon, 1997). Learners can more readily accept an e-learning system once they believe that it will help them achieve their academic goals. Hence, the study proposed the following hypotheses:

H9: Perceived usefulness has a significant positive relationship with user satisfaction of e-learning systems

H10: Perceived usefulness has a significant positive relationship with continual usage intention of e-learning systems

User satisfaction (US)

This construct is a perception of satisfaction a user has with a system in relation to what the user expected upon first use of the system (Seddon, 1997). Measures of satisfaction include adequacy, effectiveness, relevance, dependability and usefulness (Urbach and Müller, 2012). Various studies have established that user satisfaction has a significant positive relationship with continual usage intention of e-learning systems (Chen, 2010; Cho et al., 2009; Lee, 2010; Lin and Wang, 2012; Roca et al., 2006; Wang and Chiu, 2011). Thus, the study proposed the following hypotheses:

H11: User satisfaction has a significant positive relationship with continual usage intention of e-learning systems

METHODOLOGY

This is an exploratory study which was conducted at MUHAS. The questionnaires were physically distributed to all first year undergraduate students (n=408) during the end of the second semester of 2012/2013. The rate of response was 66.7%. The study developed survey questions based on existing, tested and verified instruments to ensure content validity. The first part of the questionnaire consisted of questions about the student's demographic characteristics and usage experience of internet and e-learning. The second part contained questions about factors affecting adoption of e-learning based on the research model (see Figure 1). The study adapted measures of information quality from various scholars (Cheng, 2012; Lin and Wang, 2012), and included the following items: timeliness, availability, relevance, and format of course contents delivered through the e-learning systems. Six items selected from Cheng (2012) were used to

measure system quality, which included functionality, interactivity, system responsiveness, usability and usefulness. Service quality was measured through the responsiveness, effectiveness and availability of technical support personnel items which were adapted from various studies (Balaban et al., 2013; Cheng, 2012). Metrics of instructors' quality included instructor's response, timeliness, teaching style, and explanation/help towards learners through the e-learning system, which were adapted from Cheng (2012). Three items measuring user satisfaction were adapted from Lin and Wang (2012), which were adequacy, effectiveness and usefulness. Four items selected from various scholars (Cheng, 2012; Davis, 1989) were used to measure perceived usefulness, which included the following: using the e-learning system to increase productivity and control over learning, and enhancing effectiveness.

A five-point Likert scale, ranging from ''1 = strongly disagree'' to ''5 = strongly agree'', was used for all the items in the survey questionnaire, except for self-reported use that ranged from ''never (1)" to ''extremely frequent (7)". Each construct measured between three to six items. The study used the structural equation modelling (SEM) for data analysis by using AMOS version 21.0. The study conducted Confirmatory Factor Analysis (CFA) to determine the reliability and validity of the measurement model; and the structural model was used to analyse the hypothesized relationships formulated in the conceptual framework (Hair et al 2010).

RESULTS

Table 1 describes the demographic characteristics of study participants. Three quarters of study participants (79.8%, n=217) had used the e-learning system, but most were passive users and only a few (23.1%, n=51) were actively contributing to discussions and engaging with fellow students and lecturers. Over half of the respondents (65.6%, n=145) acknowledged that they had moderate experience with using e-learning systems. Slightly less than half of respondents (40.8%, n=111) had used the e-learning systems from slightly frequent to extremely frequent.

***Table 1**: Demographic characteristics of respondents*

		Frequencies	**Percentages**
Gender	Female	112	41.2
	Male	160	58.8
Age	18 - 21 years	110	40.4
	22 – 26 years	111	40.8
	27 – 31 years	26	9.6
	32 years and above	25	9.2
Degree programs	Doctor of Medicine	139	51.1
	Bachelor of Nursing	56	20.6
	Bachelor of Pharmacy	31	11.4
	Doctor of Dentistry	21	7.7
	Bachelor of Medical Laboratory Sciences	17	6.2
	Bachelor of Science Radiation Therapy Technology	8	2.9
Years of experience with internet	Less than one year	105	39.0
	1-2 years	45	16.7
	2-3 years	25	9.3
	3-4 years	27	10.0

		Frequencies	Percentages
	5 or more years	67	24.9
E-learning usage	Yes	217	79.8
	No	55	20.2
E-learning experience	Low experience	57	25.8
	Moderate experience	145	65.6
	High experience	19	8.6
Participation in online discussions	Yes	51	23.1
	No	170	76.9
Frequency of using e-learning	Almost never	55	20.2
	Extremely infrequent	43	15.8
	Quite infrequent	33	12.1
	Slightly infrequent	30	11.0
	Slightly frequent	71	26.1
	Quite frequent	32	11.8
	Extremely frequent	8	2.9

Measurement model

The study conducted the first-order confirmatory factor analysis (CFA) to test the measurement model and to ensure the validity of the study findings. The study used several common indices to evaluate overall goodness-of-fit between the research model and the data: normed v2, root mean square error of approximation (RMSEA), comparative fit index (CFI), the incremental fit index (IFI), the non-normalized fit index (NNFI), and the adjusted goodness-of-fit index (AGFI). The ratio of the chi-squared value to the degrees of freedom X^2/df for measurement model was 1.637 (X^2 = 460.124 with df 281), which is smaller than 3 as recommended by Hair et al. (2010), and it indicated a good fit for the measurement model. Other remaining indices also exceed their respective acceptable values as recommended by the literature (Hair et al., 2010) (see Table 2). Thus, the measurement model fits the sample data well.

***Table 2**: Fit indices for measurement and structural models*

Fit measures	Recommended values	Measurement model	Structural model
X^2 /df	≤ 3.00	1.637	1.658
AGFI	≥0.80	0.825	0.824
CFI	≥0.90	0.955	0.953
IFI	≥0.90	0.956	0.954
RMSEA	≤ 0.08	0.054	0.055
NNFI (TLI)	≥0.90	0.944	0.942

The study examined reliability and validity of the survey items by using convergent validity and discriminant validity criteria. Convergent validity of the measurement scales determined the

extent to which items on a scale are theoretically related. The study assessed the convergent validity by using four indices: reliability of respective question item, factor loadings from CFA, composite reliability (CR), and average variance extracted (AVE). The reliability of survey question item was ascertained by calculating Cronbach's alpha to measure internal consistency of the multi-item scales used in this study. Table 4 shows that the Cronbach's alpha value of all variables were greater than the acceptable value 0.7 (Cronbach, 1951), thus all variables were reliable and they had high internal consistency.

Moreover, convergent validity was evaluated by examining the factor loadings from the confirmatory factor analysis (see Table 3). Literature recommends that all factor loadings should be significant and greater than 0.50 (Hair et al., 2010). The standardized factor loading for all 27 items were significant ($p<0.01$) and they had value greater that 0.6 on the respective constructs. Thus, all factors in the measurement model had adequate convergent validity.

Table 3: *Result of confirmatory factor analysis for measurement model*

	Internal reliability Cronbach alpha	**Factor loadings**
Information quality (InfoQual)	0.862	
1. The chosen e-Learning tool provides important and helpful knowledge and information for my study.		0.777
2. Overall knowledge or information provided by the chosen e-Learning tool is satisfactory		0.793
3. This e-learning tool makes it easy for me to share ideas with my group mates		0.643
4. The knowledge or information provided from the e-learning system (Moodle) is available at a time suitable for its use		0.761
5. The information provided by the e-learning system appears readable, clear and well formatted		0.751
System quality (SysQual)	0.874	
6. The e-learning system can give the means for taking tests and turning in assignments.		0.697
7. The e-learning system enables interactive communication between the instructor and learners		0.664
8. The response time of the e-learning system is consistent.		0.778
9. The response time of the e-learning system is reasonable		0.813
10. The layout of the e-learning system is user-friendly		0.721
11. The layout of the e-learning system is in good structure.		0.724
Service quality(ServQual)	0.791	
12. A specific person (or group) is available for assistance with system difficulties		0.781
13. ICT staff respond promptly		0.911
14. Overall, support services of the e-learning system are satisfactory		0.765
Instructor quality (InstQual)	0.860	
15. The instructor promptly responds to learners' questions via the e-learning system.		0.847
16. The instructor communicates well with learners via the e-		0.908

	Internal reliability Cronbach alpha	**Factor loadings**
learning system		
17. Overall, the instructor's attitude is conducive to learners' learning via the e-learning system.		0.758
Perceived usefulness (PU)	0.913	
18. Using E-learning would increase my productivity in my course work		0.853
19. Using the e-learning system gives me greater control over learning		0.867
20. Using E-learning would enhance my effectiveness in learning.		0.858
21. By using the functions of the e-learning system I can concentrate more on my other studies		0.831
User Satisfaction (US)	0.839	
22. I am satisfied with the effectiveness of e-learning system		0.819
23. I am satisfied with the performance of e-learning		0.781
24. In general, using the e-Learning tool would give me a sense of satisfaction		0.880
Continual usage intention (CUI)	0.905	
25. I intend to continue using the e-learning system for knowledge construction and sharing		0.970
26. I intend to continue using the e-learning system for my coursework frequently		0.804
27. I intend to continue using e-learning system for my coursework more in the next semester		0.917

The results of the convergent validity using CFA are further shown in Table 4. The values of CR and AVE for all constructs were greater than the minimum acceptable values of 0.7 and 0.5 (Hair et al., 2010). Thus, the research model can be considered to have acceptable convergent validity.

The study assessed the discriminant validity to determine the extent to which the items measure a construct. According to Fornell and Larker, the square root of the AVE from the construct should be greater than the correlation shared between the construct and other constructs in the model (Fornell and Larcker, 1981). Table 4 shows that the AVE of each construct is greater than the squared correlation for each pair of constructs, indicating that each construct is distinct. In summary, the measurement model demonstrated adequate reliability, convergent validity, and discriminant validity.

Table 4: *Composite Reliability (CR), Average Variance Extracted (AVE) and Discriminant Validity of constructs*

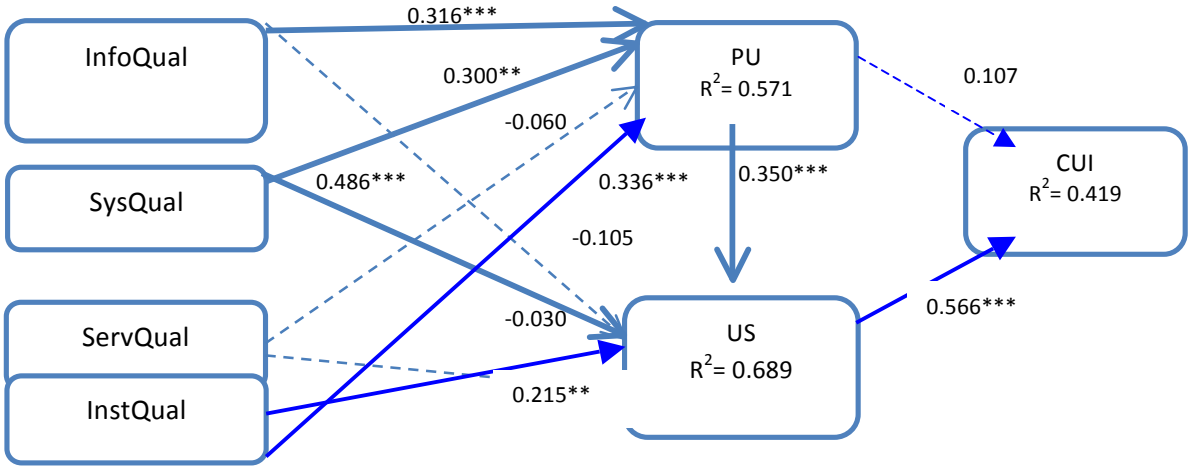
	CR	**AVE**	**US**	**InfoQual**	**ServQual**	**SysQual**	**InstQual**	**PU**	**CUI**
US	0.867	0.685	0.828						
InfoQual	0.863	0.558	0.486	0.747					
ServQual	0.861	0.675	0.483	0.590	0.822				
SysQual	0.875	0.539	0.714	0.643	0.658	0.735			
InstQual	0.877	0.705	0.629	0.435	0.476	0.570	0.840		
PU	0.914	0.727	0.707	0.619	0.483	0.651	0.617	0.852	

CUI	0.927	0.809	0.595	0.369	0.328	0.597	0.400	0.502	0.900

Structural model

The overall fit measures for the structural model included the following: X^2 /df = 1.658 (X^2 = 472.412 with df 285), AGFI = 0.824, CFI = 0.953, IFI = 0.954, TLI = 0.942, and RMSEA = 0.055. These fit indices of the structural model were greater than the recommended values as shown in Table 3, which indicate that the model fits the data well.

Hypothesis testing
The results from the structural equation modelling show that all of the hypothesized relationships were supported, except the four relationships. Figure 2 shows the standardized path coefficients, their significance for the structural model, and the coefficients of determinant (R2) for each endogenous construct.



Note: p* <0.05, p**<0.01, p***<0.001

***Figure 2**: Hypotheses testing results: standardized path coefficients and significance*

The results show that information quality had significant positive effects on perceived usefulness, but it had insignificant effects on user satisfaction, hence H1 was supported (b=0.316), but H2 was rejected. System quality was positively related to perceived usefulness and user satisfaction, hence both H3 and H4 were both supported (b= 0.300 and 0.486 respectively). Service quality had insignificant relationship with perceived usefulness and user satisfaction, hence H5 and H6 were rejected. Instructor quality was positively related to perceived usefulness and user satisfaction, hence both H7 and H8 were supported (b= 0.336 and 0.215 respectively). Moreover, perceived usefulness had significant positive relationship with user satisfaction, but it had insignificant effects on continual usage intention, hence H9 was supported (b=0.350), but H10 was rejected. Lastly, user satisfaction had significant effects on continual usage intention, hence H11 was supported (b=0.566). The model accounted for 57.1% of the variance explained in perceived usefulness, 68.9% of the variance in user satisfaction, and 41.9% of the variance in continual usage intention.

Table 5 shows the direct, indirect and total effects of information quality, system quality, service quality and instructor quality on perceived usefulness, user satisfaction and continual usage

intention. The results show that user satisfaction had higher impacts on continual usage intention than the other determinants within the model. Among the four quality-related constructs, system quality had the strongest total effect on continual usage intention.

Table 5: *The direct, indirect and total effect of variables depicted*

	Direct effects			**Indirect effects**			**Total effects**		
	PU	**US**	**CUI**	**PU**	**US**	**CUI**	**PU**	**US**	**CUI**
InfoQual	0.316	-0.105			0.111	0.037	0.351	0.006	0.042
SysQual	0.300	0.486			0.105	0.366	0.380	0.703	0.473
ServQual	-0.060	-0.030			-0.021	-0.035	-0.057	-0.046	-0.034
InstQual	0.336	0.215			0.118	0.224	0.376	0.349	0.255
PU		0.350	0.107			0.198		0.329	0.311
US			0.566						0.614

DISCUSSION OF STUDY FINDINGS

This study adapts the IS success model (Delone and Mclean, 2003, 2004), and the re-specified IS success models developed by various scholars (Chen, 2010; Cheng, 2012; Floropoulos et al., 2010; Landrum and Prybutok, 2004; Seddon, 1997) to examine the significant factors for acceptance of web-based learning management systems at MUHAS in Tanzania. The model developed, combined seven variables: information quality, system quality, service quality, instructor quality, perceived usefulness, user satisfaction and continual usage intention.

The empirical results show that system quality was a significant positive determinant of perceived usefulness and user satisfaction, derived when using the e-learning system. System quality further exhibited stronger effects on the intention to use e-learning systems more than other quality factors. Good system characteristics such as guaranteed response time, interactivity, user interface and better design functionalities are important factors in enhancing utilization and satisfaction of e-learning systems. Students usually perceive that e-learning systems are useful, and they are satisfied with using a system that provides easy and user-friendly operations, a finding that corresponds to the works of Chen (2010), and Cheng (2012).

Instructor quality was a significant predictor of both perceived usefulness and user satisfaction. The higher the instructor quality, the higher the overall usefulness and satisfaction of using e-learning systems, as perceived by the learners. These results are consistent with earlier research (Cheng, 2012; Lee, 2010). Instructor quality, such as ability to respond to students' queries and good communication to learners can increase productivity and effectiveness of student's learning processes, and consequently the overall satisfaction of e-learning system as perceived by learners.

Information quality was a significant determinant of perceived usefulness, but had no relationship with the user satisfaction. On one hand, this finding shows that if students perceive the e-learning system has accurate, updated, reliable, readable and well formatted course contents, they will find the online courses more useful for their learning processes. These results support previous research (Chen, 2010; Cheng, 2012). On the other hand, the insignificant influence of information quality on user satisfaction may be because the e-learning system had just been introduced at the University. Thus, most students were not familiar with the system, and it could be possible that they were not able to decide on the relevance of course content on the e-learning system.

Service quality had insignificant association with perceived usefulness and user satisfaction. This finding could be due to the fact that most study participants had moderate experience (65.6%, n=145) and thus service quality was not a significant factor in predicting their perceived usefulness and satisfaction. However, other studies have shown that technical guidance and support play a key role in enhancing learners' e-learning acceptance (Cheng, 2012; Ramayaha and Leeb, 2012; Roca et al., 2006; Wang and Chiu, 2011). It is important to improve ICT support services in Tanzanian institutions to enhance students' intentions to to continue using the e-learning systems. According to Wang and Chiu (2011), "learning is an interactive process between instructors and learners, not the interaction between information systems and users". Technical support for ICT is essential for enhancing service quality that can aid students to use the e-learning system, leading to increased user satisfaction with the system.

Perceived usefulness moreover had significant association with user satisfaction, but had no effects on continual usage intention of the e-learning system. Indications are that perceived benefits such as increased productivity, effectiveness, and greater control over learning can thereby increase user satisfaction with the e-learning system. The positive association between perceived usefulness and user satisfaction was consistent with earlier studies (Chen, 2010; Floropoulos et al., 2010; Lin and Wang, 2012; Roca et al., 2006; Seddon, 1997). The perceived usefulness of e-learning systems is an important extrinsic motivator for user satisfaction of e-learning system. Perceived usefulness however was insignificant in enhancing continual usage intention of e-learning systems, which may lead one to question whether students are aware of the potential benefits of e-learning system.

User satisfaction was directly and significantly associated with user intention to continue using e-learning systems, a finding that corresponds to earlier studies (Chen, 2010; Cho et al., 2009; Lee, 2010; Lin and Wang, 2012; Roca et al., 2006; Wang and Chiu, 2011). Indications are that students intend to continue using e-learning system based on their perception of using the system more than their experiences and perceived usefulness of the system.

CONCLUSIONS

This study used IS success model (Delone and Mclean, 2003, 2004), and the re-specified IS success models developed by various scholars (Chen, 2010; Cheng, 2012; Floropoulos et al., 2010; Landrum and Prybutok, 2004; Seddon, 1997) to examine the significant factors for acceptance of web-based learning management systems at MUHAS in Tanzania. The model developed, combined seven variables: information quality, system quality, service quality, instructor quality, perceived usefulness, user satisfaction and continual usage intention. The results show that quality factors (instructor and system) were a predictor of perceived usefulness and user satisfaction, and that information quality was found to significantly affect perceived usefulness. Further, perceived usefulness was a key determinant of user satisfaction, which in turn predicted continual usage intention of the e-learning systems. Understanding the nature of these factors may help universities in sub-Saharan Africa and Tanzania in particular to promote the use of e-learning systems and services for teaching and learning processes. It is thus important for e-learning system designers and providers, and course instructors to consider all these factors for effective acceptance and usage of e-learning systems and services.

IMPLICATION FOR PRACTICE

The study provides managerial insights to university management and e-learning managers on how to motivate students to continue using e-learning systems in higher learning institutions. The

implications of this study are in five folds. Firstly, the study found that system quality was a significant predictor of perceived usefulness and user satisfaction. The study suggests that system designers should develop e-learning systems with better functionalities, interactivity, user interface and guaranteed response that reflect user requirements to enhance student's acceptance and usage of the system. System designers should also conduct regular user needs survey to update e-learning system features according to user's disparate needs. Course instructors should also take the advantage of multimedia functions that exist at the e-learning systems to motivate students to use the e-learning systems.

Secondly, the findings indicated that the instructor's attitude towards e-learners had significant association with the perceived usefulness and user satisfaction. This study first suggests that instructors should give sufficient, appropriate and timely feedback to students via the e-learning systems. Secondly, instructors should develop interactive online courses to motivate students to make greater use of e-learning systems. Thirdly, the ICT directorates or e-learning unit at the universities should conduct regular continuing professional development programmes or workshops to build the capacity of course instructors on design and delivery of online courses. These workshops should be supplemented with online faculty development tutorials to improve expertise in the design and delivery of e-learning courses.

Thirdly, service quality had insignificant association with perceived usefulness and user satisfaction. However, other studies have shown that service quality play a key role in enhancing learners' e-learning acceptance (Cheng, 2012; Ramayaha and Leeb, 2012; Roca et al., 2006; Wang and Chiu, 2011). This study suggests that e-learning units or ICT directorates should play a key role in providing technical ICT support in terms of help desks, and training to students to facilitate learners' e-learning acceptance. They should also make sure that the e-learning system has adequate online help services and tutorials to enhance usage of e-learning systems among students.

Fourthly, information quality had significant relationship with perceived usefulness. This finding suggests that course instructors, designers and e-learning managers should motivate students to use e-learning systems by developing learner-centered programmes, which are relevant, regularly updated, and well formatted.

Lastly, perceived usefulness had positive impact on user satisfaction, which in turn had significant association with students' continual usage intentions of e-learning system. The e-learning system designers should therefore develop e-learning systems that deliver benefits and pleasures to learners without complicating the learning process (Cheng, 2012). However, findings showed that perceived usefulness had insignificant relationship with continual usage intention. This study suggests that e-learning managers and providers, and instructors need to educate students on the benefits of e-learning system to enhance acceptance of e-learning systems. In summary, it is important for e-learning system designers and providers to improve all quality factors (information quality, system quality, service quality and instructor quality) to make the learning process more useful, and increase students' satisfaction, which may lead to continued intention to use the e-learning systems.

LIMITATIONS AND FURTHER RESEARCH

This study has several limitations. First, the study surveyed only first year undergraduate students because they were the first batch of students to use the e-learning system at MUHAS. Second, the study did not measure net benefits, as proposed by both Delone and McLean (2004) and Seddon (1997). Thus, future studies should examine the impact of this success factor. Third, the study focused on a web-based learning management system adopted by a specific university,

and thus the study findings cannot be generalized to other universities using different e-learning systems. Further studies that assess various e-learning platforms, and which include students from different years of study and that cover multi-institutions would improve the generalizability of the study findings.

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