Modeling Electronic Learning Management Systems (ELMS) Continued usage Intentions among Facilitators in Higher Education Institutions in Tanzania

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Abstract

This study was set to model factors for Electronic Learning Management Systems (ELMS) continued usage intentions among facilitators in Higher Education Institutions (HEIs) in Tanzania. The study specifically sought to determine influence of the following factors: organization management support (OMS); facilitating conditions (FC); perceived usefulness (PU); and perceived ease of use (PEU) on continued Electronic Learning Management System (ELMS) continued usage intentions (CUIs) among facilitators in Higher Education Institutions (HEIs). In addition, 264 respondents from 6 prominent universities in the country were interviewed using a five points Likert Scale. Structural Equation Modeling (SEM) was run through Statistical Package for Social Sciences – Analysis embedded with Analysis of Moment Structure version 19 (SPSS-AMOS 19). Results from the study indicated that all hypothesized factors (Perceived Usefulness, Perceived Ease of Use and Organization Management Support with exception of facilitating conditions) positively and significantly influenced Continued Usage Intentions. The study calls for vendors, researchers and other practitioners to come together as well as forge ELMS that are simple to use, but also that enhance HEIs' efficiency and productivity. Insistence of ELMS importance from the top management including stating in the policy will improve the current use status. HEIs and other stakeholders are urged to allocate necessary resources support including stabilizing the fiber cable and power supply to enhance ELMS usage.

Keywords: Modeling; Electronic Learning Management Systems; ELMS; Continued usage Intentions; Facilitators; Higher Education Institutions; Tanzania

Introduction

For quite some time now, usage of information technology in businesses has turned to be necessary means for implementing firms' operational, tactical and strategic goals in order to remain effective as well as competitive (Alberts, 2013; Ali & Younes, 2013). Higher Education Institutions (HEIs) are also not left behind processes from being conventional to student-centered (Kagugu, 2011; Lwoga, 2014). They are moving from the conventional teaching interaction to electronic mode of education and they are working hard to embrace use of ICT in their courses to transform teaching and learning delivery (Eskilsson & Suorsa, 2014) thereby easing learning and communication among students and facilitators. It is from such innovations the Electronic Learning Management System (ELMS) technology, a web based technology that assists in planning distribution and monitoring as well as evaluation of a learning process (Ayub et al., 2010) was introduced in HEIs with vital importance in facilitating teaching and other learning processes electronically (Al-Busaidi & Al-Shihi, 2010). According to Lwoga and Komba (2015), the system is now widely used by HEIs in Tanzania in making controls; doing performance management as a tool for assessment; manage study schedule; and provision of learning contents. The ELMS are used by students, academic facilitators, administrators in training and management of online learning (Sife *et. al*., 2007).

Unlike in developing countries such as the United States of America (USA) and the United Kingdom's HLIs where usage was more than 90 percent of universities and colleges (Al-Busaidi & Al-Shihi, 2010), the systems were not widely in use in Africa and the Middle East (Mahmud, Abu, & Ayub, 2012; Mirza & Al-abdulkareem, 2011; Lwoga & Komba, 2015). For example, although it is becoming popular in HEIs (Lwoga & Komba, 2015; Raisamo & Mtebe, 2014), a survey done by Gakio (2006) from 27 countries in Africa, recorded only 54 HEIs by then to have adopted various E-learning systems for academic delivery.

Most HEIs in Tanzania including the University of Dar es Salaam (UDSM) began using the LMS in 1998 by employing the so called

Blackboard (Komba, 2009), which aimed at integrating face-to-face learning with online learning (Raphael & Mtebe, 2013). Moreover, it was recorded that despite materials being uploaded on the system, facilitation remained conventional. Open Source Moodle system replaced the Blackboard in 2008 after experiencing cost limitation including an increase in annual licensing costs, which were higher for the budget to cover than expected. Use of the Moodle brought about vibrant benefits to the University of Dar es Salaam including introduction of blended Learning programmes offered outside the UDSM Main Campus (Raphael & Mtebe, 2013). Muhimbili University of Health and Allied Sciences (MUHAS), Mzumbe University (MU) and Sokoine University of Agriculture (SUA) started implementing the Moodle ELMS in the 2000s (Lwoga & Komba, 2015; Sife *et. al*., 2007).

Despite the fact that ELMS has recorded great benefits thereby attracting continued investments in ELMS, studies document low continual usage among HEIs in Tanzania and it is unclear on sustainability of usage of available ELMS (Lwoga & Komba, 2015; Sife *et. al.*, 2007; Mtebe, 2014). Reports indicate that universities discontinued using ELMS just soon after some training on its usage. At the University of Dar es Salaam, for example, very few courses including Postgraduate Diploma in Education (PGDE), Postgraduate Diploma in Engineering Management (PGDEM) and Master degree in Engineering Management [MEM (Raphael & Mtebe, 2013)] are being run using ELMS and in most cases, they are operated under funded projects (Mtebe, 2014). Although there are few studies that investigated ELMS continued usage among students (Adeyinka & Mutula, 2010; Lwoga, 2014; Raisamo & Mtebe, 2014), there are no studies on facilitators' ELMS continued usage. Eskilsson and Suorsa (2014) as well as Kagugu (2011) continue to ponder that reasons for little usage among users are yet to be comprehensively explored (Eskilsson & Suorsa, 2014; Kagugu, 2011). Studies opine that knowing predictors for continued usage of the system in Higher Learning Institutions (HLIs) is of paramount importance (Lwoga & Komba, 2015; Lwoga, 2014). Having issues known then transformation is expected to result into increased learning gains both for universities, facilitators and students in creation including

dissemination of knowledge by allowing for opportunities for all (Eskilsson & Suorsa, 2014). Therefore, this study was set to model factors for ELMS continued usage intentions among facilitators in Higher Education Institutions (HEIs) in Tanzania. The study had the following hypotheses:

H_1: There is positive and significant relationship between organizational management support and ELMS continued usage intentions among facilitators in Higher Education Institutions.

H_2: There is positive and significant relationship between facilitating conditions and ELMS continued usage intentions among facilitators in Higher Education Institutions.

H_3: There is positive and significant relationship between perceived usefulness and ELMS continued usage intentions among facilitators in Higher Education Institutions.

H_4: There is positive and significant relationship between perceived ease of use and ELMS continued usage intentions among facilitators in Higher Education Institutions

Literature Review

Unified Theory of Acceptance and Use of Technology (UTAUT)

Unified Theory of Acceptance and Use of Technology (UTAUT) Model was developed by Venkatesh and colelagues (2003) as a result of convergence of eight prominent models including Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), a model combining Technology Acceptance Model and the Theory of Planned Behavior (TPB), Model of Personal Computer Use (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT). UTAUT was validated to explain variance in usage intention by 70 percent (Venkatesh *et. al.*, 2003). The model has four main variables, namely, performance expectancy, effort expectance, social influence and the facilitating factors which determine the behavior intentions to use technology.

As such, several scholars have used the model in modeling sustained use of technology adopted. For example, Mtebe and Raisamo (2014) in their study to determine students' intentions on use of Open Educational Resources (OER) in HEIs and Mobile Learning acceptance in HEIs found the model to be very useful in predicting usage behavior. UTAUT was also useful in Lwoga and Komba's (2015) study and proved that the theory had significant impact in explaining students' sustained usage of web-based learning management. It was with this regard that this study was guided by this model in explaining continued usage intentions of ELMS among facilitators in HEIs.

Empirical Studies

Studies on technology adoption and use context in HEIs have been done in various countries such as in the United States of America (USA), United Kingdom (Al-Busaidi & Al-Shihi, 2010) in the Middle and Far East (Fauzi, Ayub, & Shah, 2014; Mirza & Al-abdulkareem, 2011) also in Africa (Mtebe, 2014; Obadara, 2014) and Tanzania, in particular (Komba, 2009; Lwoga & Komba, 2015; Raphael & Mtebe, 2013). The center of interest on various studies have been on aspect of students' experiences, acceptance and use while in fact use of LMS in HEIs is taken on board by academic members of staff, administrators and students in ensuring education delivery with ICT facilitation. Mtebe (2014) contends that sustained usage of the ELMS is imperative because it reduces challenges faced by education sector in the African context. Studies indicate that although involvement of other stakeholders who are paramount for an ELMS continued usage, it is yet to be widely looked into in the Tanzanian context (Lwoga, 2014; Lwoga & Komba, 2015).

Studies (for example, Al-Alak & Alnawas, 2011; Lwoga, 2014) assert that success in ensuring that education is ICT led involves much investments including an attempt to address teaching and learning challenges. Bagozzi (2007) opines that based on how HEIs differ in amounts of investments they put in ICT with reference to developments of a given country, what determines its usage varies. Accordingly, use of ELMS could not be the same among HEIs in developing countries (Raisamo & Mtebe, 2014). Yet, consensus calls

together for management and organizational ICT support, conducive environment, widely selling benefits accrued from the system that, in turn, confronts performance and effort expectancy (Ishengoma & Kappel, 2008; Walker, Redmond, & Giles, 2010). For example, Al-Alak and Alnawas' (2011) investigation on academic staffs' attitudes on adoption of e-learning system in the Jordanian's HEIs in the Middle East, indicated that provision of management support through instituiton of ICT infrastructure would minimize fear from ELMS adoption and has great potential to staffs' work processes in delivering knowledge to learners (Al-Alak & Alnawas, 2011). Fauzi and colleagues (2014) did a study with the objective to understand factors that affect self-regulated learning among students through use of LMS in the Far-East. The study noted that when the learning environment is integrated with the ICT infrastructure, it does influence on students to use the ELMS (*ibid*.). According to Fauzi and colleagues (2014), instructors also were not left in this matter because they were asked to play their roles in assisting students to use e-learning systems to have a collaborative learning (Fauzi *et. al*., 2014).

Kambira (2011) researched on critical barriers affecting acceptance of E-learning at Higher Education Institutions (HEIs) in Tanzania and data were from academic as well as administrative staff of two institutions, namely, Open University of Tanzania (OUT) and the University of Dar Es Salaam (UDSM). Two critical barriers on acceptance of E-learning at HEIs were revealed, which included quality of content created and organizational culture (*ibid*.). Also majority of E-learning practitioners were found with limited skills on creating quality content and clear integration between pedagogy and ICT (*ibid*.). Such pattern, to a large extent, led to lack of awareness amongst staff members (*ibid*.). It was recommended that policy makers in HEIs should enforce institutionalization of E-learning policy as an enabling factor towards E-learning adoption (*ibid*.).

Lwoga (2014) examined factors that predict continual usage intention behaviors on the web-based Learning Management System at MUHAS among first year students of 2012/2013 cohort. The study's findings provided managerial directions that HEIs could buy to motivate

students to continue using the ELMS (*ibid*.). It provided that designers and facilitators should ensure quality of information, system, service and instructors whereby the learning process should be highly appreciated and students' satisfaction has to be achieved, a pattern believed to lead to continued intentions to use of the system (Lwoga, 2014). A study by Lwoga and Komba (2015) at Mzumbe University to establish determinants of actual usage of Web-based Learning Management System and how it can influence continued usage of the same system revealed that ELMS usage was yet to be incorporated into the teaching culture and other processes. Culture change in being electronic is thus important. Importantly, studies (such as by Lwoga and Komba, 2015; Sife *et. al*., 2007; Lwoga, 2014) emphasize on HEIs to have plans toward ELMS usage sustainability through continued updating, offering training, rewarding the best users will encourage continued usage and there has to be formulation of polices and regulations for ICT use towards academic delivery. By instituting the said aspects, one can predict planned continued usage of the system for the organization's benefit and users (Lwoga, 2014; Lwoga & Komba, 2015; Sife *et. al*., 2007).

Conceptual Model

This study proposed the following conceptual model (Figure 1) as adapted from Yoo and colleagues (2012). The conceptual model hypothesizes that Organizational Management Support (OMS), Perceived Importance (PE), Facilitating Conditions (FC) and Perceived Ease of Use (PEU) all positively influence on ELMS Continued Usage Intentions (CUI). The constructs of the model, their operational definitions and respective indicator variables are presented in Table 1.

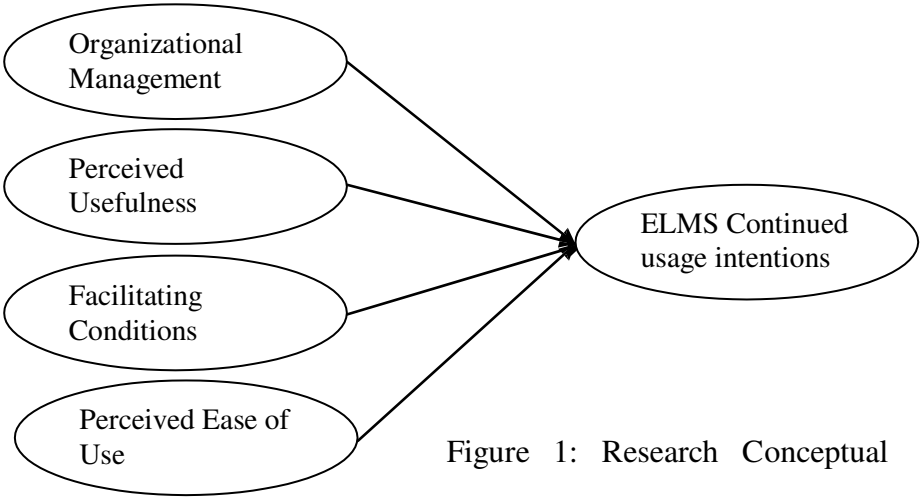

Figure 1: Research Conceptual

Table 1: Summary of Constructs, definition, items and citations

Construct	Definition	Items	Citation
Organizational Management Support (OMS)	This is the degree to which a person believes that the organizational and technical resources are available that support the use of ELMS	OMS1 - The University Management has invested in a new technology aligned with teaching curriculum OMS2 - The University has a unit of instructional design consisting of specialist for ELMS technical assistance OMS3 - The best users of ELMS are awarded OMS4 - The University top management has generally supported use of ELMS OMS5 - University Top Management encourages to learn ELMS OMS6 - The University provides resources for employees to learn ELMS OMS7 - The University top management usually helps employees when they face ELMS use problem	(Al-Alak & Alnawas, 2011; Al-Busaidi & Al-Shihi, 2010; Macharia & Nyakwende, 2010; Sife et al., 2007; Venkatesh et al., 2003)

Construct	Definition	Items	Citation
Perceived Importance (PU)	The degree to which an individual believes that using the system will assist to enhance in job performance	PU1 - The ELMS is useful for teaching and learning PU2 - Using the system enables to accomplish tasks quickly PU3 - Using the system increases productivity and efficiency of our university PU4 - Using ELMS increase chances for getting raise/promotion	(Al-Alak & Alnawas, 2011; Macharia & Nyakwende, 2010; Venkatesh et al., 2003)
Facilitating conditions (FC)	The degree to which person believes that organizational and technical infrastructure exists to support use of the system.	FC1 - Resources necessary to use the ELSM are available FC2 - I have knowledge necessary to use the ELMS FC3 - There are incentive from the University/government/donor to enable sustainable usage of ELMS FC4 - There are subsidies provided by government/donors to reduce	(Ghalandari, 2012; Li, 2010; Venkatesh et al., 2003)

Construct	Definition	Items	Citation
		the cost of using ELMS FC5 - There are suitable policies and regulations to facilitate usage of ELMS	
Perceived Ease of Use (PEU)	The degree of ease associated with the use of the system	PEU1- Interaction with the ELMS is clear and understandable PEU2 - It is easy to become skillful when using ELMS (P_EASE_USE2) PEU3 - I would find ELMS easy to use (P_EASE_USE3) PEU4 - To me learning to use ELMS is easy (P_EASE_USE4)	(Alharbi & Drew, 2014; Venkatesh & Davis, 2000; Venkatesh et al., 2003)
Continued usage intentions (CUI)	The belief that one would continue using the system in long term	CUI1 - I intend to continue - ELMS in the next sessions CUI2 - I plan to continue using ELMS in the next semester CUI3 - I intend to continue using ELMS for knowledge gathering CUI4 - I intend to continue	(Alharbi & Drew, 2014; Lwoga & Komba, 2015; Venkatesh et al., 2003)

Construct	Definition	Items	Citation
		using ELMS for knowledge creation CUI5 - I intend to continue using ELMS for sharing knowledge CUI6 - I predict that I would use ELMS in the coming academic year CUI7 - I plan to continue using ELMS often to facilitate learning	

Research Methodology

Although this study targeted to have 300 respondents, the study used only 264 respondents, a number of questionnaires retuned till the analysis stage. The distribution of respondents and their respective percentages in brackets were 67 (25.4%) from University of Dar es Salaam (UDSM), 56 (21.2%) from Sokoine University of Agriculture (SUA), 64 (24.2%) from Muhimbili University of Health and Applied Sciences (MUHAS), 59(22.3%) from Mzumbe University and, 18(6.8%) from Hurbert Kairuki Memorial University (HKMU). A five points Likert Scale from 5 (strongly agree) to 1 (strongly disagree) were used. Instrument's reliability was confirmed through Cronbach's alpha test, while use of past instruments and convergent validity test was used for validly confirmation.

Structural Equation Modeling (SEM) was run through Statistical Package for Social Sciences embedded with Analysis of Moment Structure version 19 (SPSS-AMOS 19). According to Hair and colleagues (2010), SEM can examine a series of dependent relationships simultaneously, combining aspects of factor analysis and multiple regressions that enable the researcher to concurrently examine a series of interrelations among observable (manifest) variables and unobservable (latent) variables. Teo (2009) adds that SEM also enables each error for each variable to be independently estimated, something, which other multivariate analysis techniques fail to do.

Before heading on other tests, the study tested whether the sample was reliable or not. As per Table 3, a Cronbach's coefficient of 0.834 was obtained indicating that the instrument was reliable.

Table 2: Reliability Statistics

Constructs	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
OMS, PU, FC, PEU, CUI	.834	.897	27

To measure sampling adequacy (that is, to test if the sample was large enough to carry out factor analysis), the KMO test was used, while Bartlett was used for hypothesis test that the sample was drawn from the population in which correlation matrix was zero. According to Kaiser (1974), the KMO value is supposed to be greater than 0.5 and the p-value for the Bartlett's test should be less or equal to significance level (0.05) if factors are to be considered adequate for analysis. Results from this study revealed that KMO value was 0.887>0.5, while the p-value for Bartlett's test was 0.000<0.05 (Table 3). Hence, the model was suitable for the study dataset.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	3115.599
	Df	231
	Sig.	.000

The analysis process by this study started by first running Exploratory Factor analysis (EFA) to assess factor loading so as to extract maximum variance from theorized items (see also Amer, 2012; Hair *et. al*., 2010). Principal components analysis was used in order to enable the researchers to reduce the number of items while keeping as much original item variance as possible (see Amer, 2012). The outcome was rotated using Varimax rotation and a cut-off point of 0.40 was used for cross-loadings. Items that did not load strongly on the intended factors were dropped and were not considered in subsequent analysis (see also Hair *et. al*., 2010). Table 4 provides summary of tests. A Confirmatory Factor Analysis was later tested to validate the model and test the hypothesized relationships. Based on the conceptual model presented in Figure 1, the study hypothesized four independent variables: Organizational Management Support, Facilitating Conditions, performance expectance and Perceived ease of Use to influence Continued Usage Intention among facilitators as a dependent variable.

Table 4: Exploratory Factor Analysis

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
CUI3	.880				
CUI5	.843				
CUI7	.837				
CUI4	.829				
CUI2	.778				
CUI1	.756				
CUI6	.707				
OMS4		.772			
OMS1		.758			
OMS5		.754			
OMS2		.683			
OMS6		.597			
PU3			.792		
PU2			.737		
PU1			.683		
FC4				.889	
FC3				.787	
FC5				.704	
PEU3					.720
PEU4					.694
PEU1					.663
PEU2					.599

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Model Goodness of Fit Assessment

Although there are several indices when one uses SEM, categorized into three, namely, absolute fit indices; incremental fit indices; and parsimony fit indices (Hair *et. al*., 2006; Hoe, 2008), this study was guided by Hair and colleagues (2006). The guideline by Hair and co-workers (2006) suggests that fitness should be evaluated using at least one absolute fit index and at least one incremental fit index was applied. Hair and others (2006) and Hoe (2008) argue that using at

least four fit indices is better so as to avoid conclusion with bias. The applied incremental fit indices were Comparative Fit Indices (CFI) and Tucker Lewis Index (TLI), while applied absolute fit indices were chi-square (χ^2) statistic and Root Mean Square Error of Approximation (RMSEA). Since χ^2 is very sensitive to an increase in sample size and the number of observed variables (Hair *et. al*., 2006), the ration of χ^2, to its degree of freedom (CMIN/DF) called normed χ^2, was used instead. The recommended guidelines that this study adhered to in assessment of Model Goodness of fit were adapted from Hair and colleagues (2006) and Teo (2009) as presented in Table 4, which are $\chi^2/df<3$, TLI>0.90, CFI>0.90, RMSEA≤0.0, SRMR<0.05, IFI>0.90.

Table 4: Recommended Guidelines for Model Goodness of Fit

Model Fit Indices	**Recommended guidelines**	**Citations**
χ^2/df	<3	Kline, (2005); Hair et al. (2006).
TLI	>0.90	Klem, (2000); McDonald and Ho, (2002); Hair et al. (2006).
CFI	>0.90	Klem, 2000; McDonaldand Ho, 2002; Hair et al. (2006).
RMSEA	≤0.08	McDonaldand Ho, (2002); Hair et al. (2006).
SRMR	<0.05	Klem, (2000); McDonald and Ho, (2002); Hair et al. (2006)
IFI	>0.90	Ho, (2002); Hair et al. (2006).

Source: Adapted from Hair et al. (2006) and Teo (2009)

There are three known strategies in model specification and evaluation (Joreskog and Sorbom, 1996): strictly confirmatory such that a single prior model is studied (Hair, et al., 2006; Tabachnick and Fidell 2007), the model generation whereby an initial model seeks to fit the data and then modified as necessary until it fits perfectly (Elly, 2010); and alternative models such that prior models are specified as well as evaluated (MacCallum and Austin, 2000).

This study started by model generating strategy by adjusting index cut-off values based on model characteristics. A conceptualized model was modeled through use of modification indices to improve the model. Hair and colleagues (2006) suggest, among others, use of modification indices to adjust the index cut-off values based on model characteristics but with the aim to improve the model. Modification indices offer suggested remedies to discrepancies between the proposed and estimated models. This study employed modification indices approach by eliminating all variables that were loading highly in their modification indices values while taking care of not altering the theorized model. It was important to do so because some criteria for goodness of fit were below the threshold level. The initial analysis shown in Figure 2 indicates that the CFI, TLI and IFI were only .878, .863 and .879, respectively, indicating that the basic model was not good, since the indices were slightly below the recommended range. The Normed Chi-Square (CMIN/DF) and RMSEA were within required ranges, occupying 2.272 and .082, respectively. Thus, the model in Figure 2 was discarded and was not used for any further analysis.

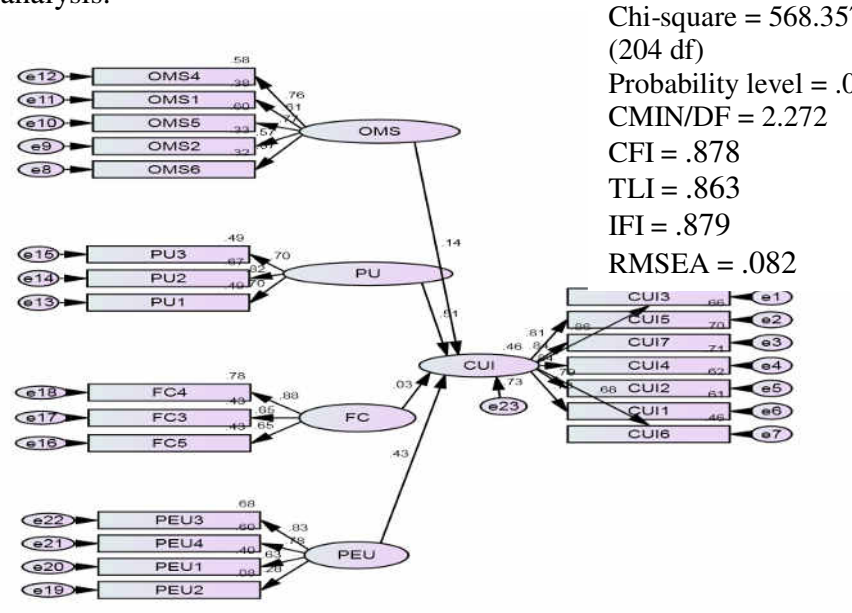

Figure 2: Initial analysis for Model Goodness of Fit

The researchers had to screen, through modification indices, if there was any possibility to improve the model. The results of index cut-off through modification indices are shown in Figure 3.

Removal by modification indices technique was guided by Hair and colleagues (2006) who recommend eyeing to modification indices for covariance. They (*ibid*.) forbid co-varying error terms with observed or latent variables or with other error terms that are not part of the same factor. Thus, the only modification allowable for this study was to co-vary error terms that were part of the same factor. Through this guideline, the error terms, which indicated, through analysis, to be highly covariated and that were part of the same factor were covariated. Based on modification indices, the error terms for the dependent variable, *"CUI,"* were covariated due to the fact that most of the error terms (Figure 3) seemed through modification indices to be highly covariated. The items expressing "CUI" were: *CU3 I intend to continue using ELMS for knowledge gathering; CUI5 I intend to continue using ELMS for sharing knowledge; CUI7 I intend to continue using ELMS often to facilitate learning; CUI4 I intend to continue using ELMS for knowledge creation; CUI2 I intend to continue using ELMS in the next semester; CUI I intend to continue using ELMS in the next sessions; and CUI6 I predict that I would use ELMS in the coming academic year.*

Analysis of the Adjusted Basic Model

Recall, the basic model of this study had four hypotheses that were formulated to positively influence on ELMS Continual Usage Intentions. They include the following: Organization Management Support, Perceived Usefulness, Facilitating Conditions and Perceived Ease of Use. Figure 3 provides summary of results for the Goodness-of-Fit indices, while Table 5 summarizes regression weights, both non-standardized and standardized.

The Basic Model adjusted (Figure 3) has Goodness of Fit indices indicating that the resultant model passed the minimum criterion and thus, was passed to explain the relationship between the hypothesized independent variables: "Organizational Management Support,"

"Perceived Usefulness," "Facilitating Condition" and Perceived Ease of Use" against the dependent variable "ELMS Continued Usage Intentions" among facilitators in higher education institutions in Tanzania. From the analysis, the resultant model passed for goodness-of-fit. The CMIN/DF, RMSEA, CFI, TLI and IFI all attained the minimum requirements, like they are shown in brackets against the chosen indices: CMIN/DF (2.273); RMSEA (0.070); CFI (0.920); TLI (0.901) and IFI (0.921). The values fall within the acceptable range. This is according to scholars (for example, Kenny, 2012; Hoe, 2008; Chen *et. al*, 2008; Hair *et. al*., 2006; Ullman, 2006; Kline, 2005; McDonald and Ho, 2002; Klem, 2000) who recommend a cut-off point for Chi-Square to DF ratio (CMIN/DF) to be 3:1 or less and RMSEA values from less than 0.05 and up to 0.08 and CFI, TLI, and IFI each above 0.90 if the model is to be considered fit and thus, shows that the resultant adjusted basic model fits the data well.

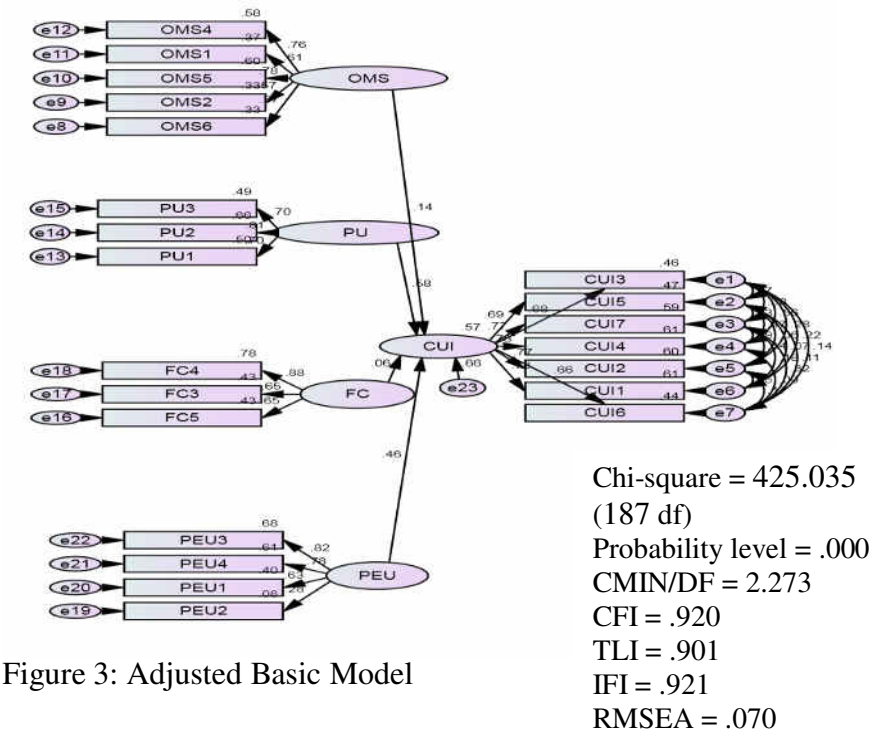

Figure 3: Adjusted Basic Model

Hypotheses Tests

After verifying for model's fitness, hypotheses tests were done whether or not they are supported with results. Table 7 shows results from the hypotheses tests and path coefficients of the adjusted basic model from four exogenous variables that were theorized for the study. The hypothesized relationships were examined against various coefficients and scores based on direction, strength and significance level of the path coefficients (Elly, 2010). According to Elly (2010), standardized regression weights called standardized path coefficient (γ), critical values (C.R) and p-values, respectively, were compared against the cut-off level. By Critical Value (C.R), it denotes the value of test statistic (*t* test, F test) that designates a specified significance level. For example, 1.96 denotes a 0.05 significance level for the *t*-test with large sample sizes. A positive path coefficient (γ) indicates that the relationship is positive and vice versa is true for negative path coefficient. The standardized path coefficient is associated with critical values, C.R, using p-value for significance level.

Results showed that all items positively and significantly influenced their respective dependent variable except "FC" standing for facilitating conditions. The OMS, (γ = 0.126, p= 0.021, CR=2.301); PU (γ = 0.491, p =***, C.R = 6.532) and PEU (γ = 0.435, p =***, C.R = 3.542) each indicated significant relationship for CUI (Continued Usage Intentions). While FC [facilitating conditions (γ = 0.050, p= 0.276, CR=1.089)] though indicated a positive as pointed out before, had no significant relationship to CUI (ELMS Continued Usage Intentions). In other words, when Organization Management Support goes up by a one standard deviation, ELMS Continued Usage Intentions goes up by 0.126 standard deviations. Similarly, when Perceived Usefulness goes up by one standard deviation, it causes increased ELMS Continued Usage Intentions by 0.491 standard deviations. Also when Perceived Ease of Use goes up by one standard deviation, ELMS Continued Usage Intentions goes up by 0.435 standard deviations. Facilitating Conditions, though had a positive effect; its influences to ELMS Continued Intentions were not significant, as when Facilitating Conditions goes up by one standard

deviation, it causes only 0.050 increases of ELMS Continued Usage Intentions which is insignificant. It means that Continued Usage Intentions will be likely if the ELMS is perceived useful and perceived ease to use, under adequate organization management support facilitating conditions. More discussion regarding hypotheses test results is presented in the subsequent section. Table 5 and Table 6 summarize the non-standardized and standardized regression weights, respectively.

Table 5: Unstandardised Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
CUI	<---	OMS	.126	.055	2.301	.021	par_18
CUI	<---	FC	.050	.046	1.089	.276	par_19
CUI	<---	PU	.491	.075	6.532	***	par_20
CUI	<---	PEU	.435	.123	3.542	***	par_21
CUI3	<---	CUI	1.000				
CUI5	<---	CUI	1.042	.095	10.986	***	par_1
CUI7	<---	CUI	1.160	.112	10.342	***	par_2
CUI4	<---	CUI	1.149	.095	12.075	***	par_3
CUI2	<---	CUI	1.200	.123	9.779	***	par_4
CUI1	<---	CUI	1.203	.125	9.607	***	par_5
CUI6	<---	CUI	1.105	.129	8.545	***	par_6
OMS6	<---	OMS	1.000				
OMS2	<---	OMS	1.017	.144	7.056	***	par_7
OMS5	<---	OMS	1.225	.146	8.407	***	par_8
OMS1	<---	OMS	1.020	.138	7.380	***	par_9
OMS4	<---	OMS	1.261	.151	8.342	***	par_10
PU1	<---	PU	1.000				
PU2	<---	PU	1.187	.117	10.113	***	par_11
PU3	<---	PU	1.169	.123	9.480	***	par_12
FC5	<---	FC	1.000				
FC3	<---	FC	1.075	.123	8.751	***	par_13
FC4	<---	FC	1.310	.157	8.355	***	par_14
PEU2	<---	PEU	1.000				

			Estimate	S.E.	C.R.	P	Label
PEU1	<---	PEU	.989	.249	3.971	***	par_15
PEU4	<---	PEU	1.329	.325	4.087	***	par_16
PEU3	<---	PEU	1.284	.313	4.098	***	par_17

Table 6: Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
CUI	<---	OMS	.142
CUI	<---	FC	.064
CUI	<---	PU	.576
CUI	<---	PEU	.459
CUI	<---	e23	.659
CUI3	<---	CUI	.680
CUI5	<---	CUI	.685
CUI7	<---	CUI	.770
CUI4	<---	CUI	.778
CUI2	<---	CUI	.774
CUI1	<---	CUI	.782
CUI6	<---	CUI	.662
OMS6	<---	OMS	.572
OMS2	<---	OMS	.573
OMS5	<---	OMS	.775
OMS1	<---	OMS	.612
OMS4	<---	OMS	.759
PU1	<---	PU	.704
PU2	<---	PU	.812
PU3	<---	PU	.698
FC5	<---	FC	.654
FC3	<---	FC	.654
FC4	<---	FC	.883
PEU2	<---	PEU	.277
PEU1	<---	PEU	.631

			Estimate
PEU4	<---	PEU	.779
PEU3	<---	PEU	.823

Summary of Constructs' Influences on ELMS Continue Usage Intentions

Results showed that Continued Usage Intentions was positively and significantly influenced by Perceived Usefulness; Perceived Ease of Use; and Organization Management. Surprisingly, facilitating conditions though indicated positive, their influence was not significant.

Table 7: Summary of Hypotheses Tests

Hypothesis	Path	P-Value	Remarks		
			Direction	Significance	Acceptance
H1	OMS → CUI	0.021	Positive	Significant	Accepted
H2	FC → CUI	0.279	Positive	Not Significant	Not Accepted
H3	PU → CUI	***	Positive	Very Significant	Accepted
H4	PU → CUI	***	Positive	Very Significant	Accepted

Source: Field Data Analysis

To summarize, the aim of structural models analysis in SEM meant to test for hypotheses if they passed the Goodness-Of-Fit test. Thus, it can be concluded through hypotheses tests using the structural conceptualized model produced the best goodness of fit. The model is an alert of importance of both HEIs and vendors by ensuring that any ELMS to be introduced must be perceived useful and perceived easy to use. Besides, there should be noteworthy organization management support to inculcate continued usage intentions.

Measurement Model

In this study, the discussion of measurement model considered the model that graduated for the best fit. According to Hair and colleagues (2006), if a model does not pass the first test, it is not considered for further measurement model analysis. Having sufficiently specified the measurement model, the other fundamental task was to test SEM for validity and reliability. The study considered validity and reliability of both measurements (indicator variables) and structural (path coefficients) in the model. The analysis procedure followed in this study was basically Confirmatory Factor Analysis (CFA). Unlike Exploratory Factor Analysis (EFA), CFA enables the researcher to perform an exact test of the measurement theory by specifying correspondence between indicators and constructs (Hair *et. al*., 2006). This is because the EFA provides no more than insights into structure of items and may be helpful in proposing the measurement model, but it does not test the theory. In other words, EFA only explores data to identify potential constructs, while results of CFA enable the researcher to test or confirm whether or not a theoretical measurement model is valid. With CFA, the best model is that fits the data most (Hair *et. al*., 2006).

Validity and reliability of the best models were compared with the *de facto* standards as summarized in Table 9 generated from Tabachnick and Fidell (2007); Straub and colleagues 2004; Nelson and Ghods 1998) as the benchmark for comparison.

Another fundamental assessment of validity this study did was to measure the relationship between items and constructs (the *path estimates* linking constructs to indicator variables). Hair and co-workers (2006) assert that once CFA is used, a good conceptual understanding of the relationship between construct and its items should exist. The rule of thumb suggests that standardized loadings with at least 0.5 and ideally 0.7 or higher were cut-off value to confirm that indicators were strongly related to their associated constructs as well as an indication of construct validity. Moreover, the statistical significance of each estimated (free) coefficient was assessed in order to test strength, score of co-efficiency, significance and direction of

relationship of the measurement models. As indicated in Table 6, higher loadings and significant estimates ($p<0.01$ or considerably $p<0.05$) as suggested by Hair and colleagues (2006) were passed and beyond that they were dropped as insignificant.

Squared multiple correlations (R^2) or Variances explained for each measured variables whereby CFA represents the extent to which a measured variable's variance is explained by a latent factor (how well an item measures a construct) are displayed by the model. R^2 is interpreted as relative variance of the dependent variable explained or accounted for by explanatory variables (Hair *et. al*., 2006). It is also referred to as items reliability, communality or variance extracted. The results showed that predictors of Continued Usage Intentions, which are OMS, FC, PU, and PEU explained 56.6 percent of its variance. Thus, revealed evidence that the Adjusted Basic Model was a strong model. Table 8 provides details.

Table 8: Squared Multiple Correlations (Group number 1 - Default model)

	Estimate
CUI	.566
PEU3	.678
PEU4	.608
PEU1	.398
PEU2	.077
FC4	.779
FC3	.427
FC5	.428
PU3	.487
PU2	.660
PU1	.495
OMS4	.577
OMS1	.375
OMS5	.601
OMS2	.328
OMS6	.327

	Estimate
CUI6	.438
CUI1	.612
CUI2	.600
CUI4	.606
CUI7	.593
CUI5	.470
CUI3	.462

To deal with accuracy of measurement, construct validity was tested to see the extent to which a set of measured items actually reflected theoretical latent construct items designed to measure. According to Hair and others (2006), evidence of construct validity provides confidence that item measures taken from a sample represent the actual true scores that exist in the population. Convergent validity as the extent to which a set of items that are indicators of a specific construct converge or share a high proportion of variance was also tested. They were measured by standardized factor loadings and 0.5 or higher, considered as ideal, while 0.7 or higher values are regarded significant. Also tested was the discriminant validity- the extent to which a construct is truly distinct from other constructs. According to Tabachnick and Fidell (2007), high discriminant validity provides evidence that a construct is unique and captures some phenomena, which other measures do not. CFA provides two common ways of assessing discriminant validity, first, correlations between any two constructs can be specified (fixed) as equal to one; and second, a more rigorous test is to compare average Variance-extracted values for any two constructs with the square of the correlation estimate between the two constructs. Variance-extracted should be greater than the squared correlation estimate. The logic here is based on the idea that a latent construct should explain more of the variance in its item measures than it shares with another construct. Based on the findings provided in Table 7, the test was passed providing good evidence of discriminant validity. Literature avows that if high cross-loadings indeed exist, and they are not represented by the measurement model, the CFA fit should not be good. Lastly, there was face validity. Face validity assesses

whether every item's content or meaning is actually that is intended (Tabachnick and Fidell, 2007). The matrices of construct correlations were useful in this assessment. Table 9 gives details.

Table 9: Study Model Validation

Validity component	**Technique used**	**Heuristic/de facto standards**	**Adjusted Basic Model**
Discriminant Validity	CFA as used in SEM	CFI>0.90; TLI>0.90; IFI>0.90; χ^2 and significant t-values for items loadings	CMIN/DF=2.273; χ^2=425.035; df=187; p<0.000.; CFI=0.920.; TLI=0.901; IFI=0.921; RMSEA=0.070; t-values are significant. C.f Figure 2.
Convergent Validity	CFA as used in SEM	CFI>0.90; TLI>0.90; IFI>0.90; χ^2 and significant t-values for items loadings	χ^2=425.035; df=187; p<0.000.; CFI=0.920.; TLI=0.901; IFI=0.921; RMSEA=0.070; t-values are significant. C.f Figure 2.
Reliability (Internal Consistency)	Cronbach alpha (α)	Cronbach alpha (α) should be above 0.60 or 0.70	Cronbach alpha (α) values are above 0.70; C.f Table 2
Content validity	Literature review; expert panels	Higher degree of consensus	Study instrument reviewed and consider experts opinion, pilot tested
Predictive validity	SEM	Variances Explained in the 0.40 range or above are desired	Variances Explained for Continued Usage Intentions is 0.57

Discussion of Findings

The discussion is done based on each construct and its influence on continued intentions to use ELMS in executing facilitators' obligation in the HEIs in Tanzania.

Perceived Ease of Use (PEU)

The term "perceived ease of use" was used to denote a toil an individual expends to get as well as use technology (Electronic Learning Management System for this case). It was operationally not only to include accessibility to the technology but also affordability in terms of cost (time, money, skills) to use it. Evidence (for example, Davis *et. al*., 1989; Venkatesh, 2000; Venkatesh *et. al*., 2003; Moon and Kim, 2001) suggests technology that is perceived ease to use is less threatening to individual adopters and is expected to have a positive influence on users' intention to use that particular system or technology (Davis, 1989; Venkatesh and Davis, 2000; Venkatesh, *et. al*., 2003) including Electronic Learning Management Systems.

This study postulated perceived ease of use to be positively and significantly influencing Intention to Use Electronic Learning Management Systems. Where ELMS was expected to be easy to use then, there was likeliness that there would be continued usage intentions. Results from the analysis indicated that a proportional change in a (1) standard deviation of perceived ease of use corresponds to a 0.435 increase in standard deviation of the ELMS Continued Usage Intentions. The p-value = 0.000 indicated a very significant relationship between perceived ease to use and continued usage intentions, while C.R value indicated that the relationship was positive with a value of 3.542.

The study concurs with many other studies (regardless of the technology in question), which previously found a similar trend. In other contexts of technology adoption, a similar trend was exhibited. For example, Dulle and Majanja's (2011) study on open sources adoption and use revealed that where expendable effort was required to access an open source then, one was reluctant to adopt and use that source, and the vice versa was true where Effort Expectancy was low.

The study by Agarwal and colleagues (2007) on factors affecting 3G Adoption revealed that price and convenience were the two most important factors to keep in mind when offering 3G services. It implies that if the ELMS was too costly to be afforded and if it requires a lot of time to learn to use it or if it involved a lot of procedural steps to use it then, it would create reluctance for users to adopt it rather than it is for the opposite. Thus, Agarwal and co-authors (2007 cited in Masele, 2014), advice that rather than simply providing a large variety of services, it is important to link those services to convenience, leading to savings in time and effort of the user towards adopting as well as using a particular technology.

Seeveral researchers advised several measures to be taken so as to improve technology perceived ease of use. They include, among others, making the technology available and affordable as well as provision of orientation and training on how and why a certain technology is to be used. Price needs to be brought down to make services sufficiently attractive for wide-scale adoption (Agarwal *et. al*., 2007) because if technology is available at relatively high prices, then it may totally demoralize any intentions towards adoption that might be on ground. Considering busy schedules the HEIs facilitators are subjected in, it deems important to ensure that ELMS is less costly and expending less efforts so as to be perceived easy to use by everyone.

Lack of orientation to a particular technology is another cited determinant to Perceived ease to use ELMS. It is argued that where one is more oriented to particular technology and has enough required experience; the system will be easier to use (Agarwal and Prasad, 1998; Davis, Bagozzi, and Warshaw, 1989; Thompson, Higgins, and Howell, 1994). Davis (1989) found that training is a straightforward way to attack ease of use. Wolski and Jackson (1999) consider training as a way to overcome resistance associated with perceived difficulty with technology use because it imparts new skills, knowledge and insights (Edgcomb, 2002), which, in turn, can change attitude and increase convenience as well as confidence to work with a particular technology. On the other hand, training is another way for creating a highly productive and competitive workforce (Marshall, Mills and Olsen, 2008).

This study calls for vendors, academicians and other practitioners to come together and forge ELMS that are simple to use, making them not only available to the market but also that are affordable in terms of acquisition and maintenance costs. Such measures will not only increase perceived ease to use but also would foster perceived ease of use ELMS in question.

Perceived Usefulness (PU)

Perceived Usefulness was defined by this study as the extent to which a person believes that using a particular system will enhance his or her job (teaching and assessment for this case) performance. Previous studies provided evidence that users are driven to adopt a technology primarily because of functions it provides them and secondarily, because of easiness of benefiting from those functions (Davis, 1989; Willis *et. al.*, 2008). Nonetheless, customers are often willing to overlook some difficulties of usage if service provides critically needed functions (*ibid.*). This study also posited that the higher the perceived usefulness among facilitators, the higher the influence on ELMS continued usage intentions. Findings indicated that a proportional change in a (1) standard deviation of perceived usefulness corresponds to a 0.491 increase in standard deviation of the ELMS Continued Usage Intentions. The p-value of 0.000 indicates a very significant relationship between perceived usefulness and continued usage intentions, while the C.R value indicated that the relationship was positive with a value of 6.532. Such findings are concurrent with most other studies on technology adoption for private benefits where adopters were found to adopt and continued using various technologies where there was some perceived useful gains related to such adoption.

In this study, where ELMS was perceived useful it was demonstrated to be happily received and adopted. At UDSM, for example, as posited before, ELMS is being used in running the Postgraduate Diploma in Education (PGDE), Postgraduate Diploma in Engineering Management (PGDEM) and Master Degree in Engineering Management (MEM). One of the instructors from the School of Education at the UDSM posited that,

> "In all my lectures, I usually orient my students to use Moodle. The system has been so useful not only in teaching but also in assessing them. I remain solely a moderator while in office or at home on aspects like group discussions. Besides, the system allows setting time for each exercise but also submission time…"

Other scholars (for example, Venkatesh *et. al*., 2003) have posited that Perceived usefulness is one of the vital factors that have been created in determinants of Perceived Ease of Use and can expect user intentions of utilizing e-learning management systems (Elkaseh *et. al*., 2015). This further supports previous researchers who found a significant correlation between job relevance systems and perceived usefulness of a system as well as continued systems use intentions.

Organizational Support

Organizational support was operationally defined in this study as an individual's feeling and perception on top management encouragement together with allocation of adequate resources to support usage of new technology. It is especially true with complicated technologies on role of organizational support which is essential. At least perceived organizational support is viewed to be important to organizations in terms of success and commitment of employees towards use of new technology through modifying employees' efforts to meet organizational goals (Loi, Hang-Yue and Foley, 2006), and impacting users' self-efficacy for completing task(s) including perceived value from completion (Henry and Stone, 1995). This study too postulated that organizational support would positively influence ELMS Continued Usage Intentions among firms. As it was pointed out before, findings indicated a positive and significant relationship between organizational management support including continued usage intentions. A proportional change in a (1) standard deviation of organizational management support corresponded to a 0.126 increase in standard deviation of the ELMS Continued Usage Intentions.

This study was of opinions that management support could take different forms including time and other resources provision in aspects like training in order to support use of ELMS. Through provision of

this support (e.g., sponsoring training), it would overcome resistance associated with perceived difficulty with technology use (Wolski and Jackson, 1999) by imparting new skills, knowledge and insights (Edgcomb, 2002), which, in turn, can change attitude and increase convenience as well as confidence to work with a ELMS in place.

However, the study found a slightly blurring situation, which the study opined to have contributed to poor continued usage intentions of ELMS in the HEIs visited. For example, in one of visited institutions, a person from the ICT commented that e-learning to them was not fully carried to all programs but only to some of the courses/modules. The respondent remarked that,

> "Few faculties are using the system. If there was an enabling environment, people would have paid a lot of interests. Imagine that despite the fact that they are not being rewarded, those who use it have a lot of interests. They use it voluntarily because it is not mandatory on usage for others. Strategies are being devised to ensure use of the system though the university emphasis is mostly on traditional ways of instructions. Facilitators voluntarily engage themselves without any formal support by the university."

Emphasis on awareness creation among staff members was placed down by this study to increase ELMS usage level in order to tap numerous potentials therein. Insistence from the top management including stating in the policy will improve the current status of e-learning. Other studies (for example, Sife *et. al.,*2007; Raphael and Mtebe, 2013; Mtebe 2015) emphasize on this and suggest for updating policies, enhance supportive services and introduction of user awareness programs to enable all users well vested with the system for long life learning among the HEIs in Tanzania.

Facilitating conditions

Recall, this study used the term facilitating conditions to refer to degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh *et. al.,*

2003). Facilitating conditions may include, among other aspects, technology user training, infrastructure development, provision of financial incentives such as subsidies, grants and presence of appropriate national policies in order to persuade firms as well as individuals to adopt intended technology (UNCSD, 1999; Infate and Smirnova, 2009). Findings from this study indicated that a proportional change in a (1) standard deviation of facilitating conditions corresponded to a 0.050 increase in standard deviation of the ELMS Continued Usage Intentions. The C.R value indicated that the relationship was positive with a value of 1.089. Being positive, it means that facilitating conditions (FC) contribute to continued ELMS usage intentions. This is in line with other studies (for example, Bakar, Razak, & Abdullah, 2013), which also found that facilitating conditions had positive relations to continued ELSM usage intentions. However, scoring a p-value of 0.276 indicates an insignificant influence on facilitating conditions to continued usage intentions. This is in line to results by Lwoga and Komba (2014, 2015), which also found facilitating conditions to have no significant relationship to ELMS continued usage intentions among students. However, findings from this study are contrary with what Abu Shanab and Pearson, (2010) found that facilitating condition were one of important determinants for commitment towards new technology adoption (including ELMS). They also contradict what Dulle and Minishi-Majanja (2011) advised on the need for improvement of facilitating conditions in Tanzanian universities for effective exploitation of services, which, in their case, was open access scholarly communication.

Nonetheless, the observation from this study led to note several ground works to facilitate usage of ELMS. For example, dueing interviews with one head of ICT section at Mzumbe University, it was confirmed that they installed notable facilities to make possible ELMS usage. Such facilities included wireless access points across classes and offices but they were challenged with internet connection break outs despite being connected to fiber optic cable. There was also a power problem and inadequate number of computers. As a result, users from all faculties were mandated to share learning materials with students. At the University of Dar es Salam (UDSM) and Sokoine University of

Agriculture (SUA), although they have necessary infrastructure including an instructional unit for facilitating ELMS use, the facilities were inadequate in number. Besides, problems like internet connectivity, power cut problems and skills of use could be clearly noticed. Therefore, this calls for attention to the government to continue stabilizing the fiber cable and power supply while other items may be handled by the university management. Some good news include that UDSM, through its Centre for Virtual Learning (CVL), has initiated the so called One-to-One Moodle coaching where technical personnel from CVL visit facilitators after a call for assistance to learn Moodle. Besides, it is very recent that the project called "Building Stronger Universities (BSU)" that involved several Universities in Tanzania including SUA and UDSM had just ended, which had two components, namely, Problem Based Learning (PBL) and E-Learning, among others whereby users were oriented to use Moodle in preparing learning materials for students. Difference from other studies is that facilitating conditions insignificantly predict/explain ELMS continued usage intentions. The study supposes that given time lapse since introduction of Moodle and the level of literacy including self-efficacy may explain its insignificance when intentions come to prediction of continued usage.

Conclusion and Implications of the Study

Results from the study indicated that all hypothesized factors (Perceived Usefulness, Perceived Ease of Use, and Organization Management Support with exception of facilitating conditions) were positive and significantly influenced Continued Usage Intentions. It implies that for ELMS Continued Usage Intentions to be ensured, the system has to be perceived not only easy to use by facilitators but also should be perceived useful. Besides, because it requires hands-touch or interaction on the system, it was noted important that instituted ELMS should be user-friendly and its features are easy to capture. The findings depict for a system to be perceived useful and it should be that enables accomplishment of tasks quickly, with record in productivity, but also, whose interaction with it is clear from users to find ease to learn and use. Based on findings from this study, both organization management support and facilitating conditions were found positively

influencing continued usage intentions thereby calling for institutions to offer remarkable organizational management support to facilitators in terms of resources (time, fund, equipment and people) allocation to staff in the course of ELMS usage. Already, the respective institutes had supportive units of instructional design for technical assistance with resources made available necessary for system use. It was further found that all mentioned items, to a large extent, need facilitation through availability of suitable policies and regulations. Yet, facilitating conditions, regardless of being positive, its influence was insignificant despite being mentioned in other literature as an important factor for technology usage and adoption.

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