

## FACTORS INFLUENCING E-LEARNING IMPLEMENTATION IN TANZANIAN UNIVERSITIES

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### ABSTRACT

Website design and optimization has become natural extension on learning in many universities nowadays as it moves learning materials to online in the name of e-learning. The said website design and optimization enhances the e-learning for the purpose of facilitating and providing flexibility in teaching and learning activities. However, the progress of e-learning implementation is yet to be adequate in many universities in developing countries including Tanzania. This study, investigated factors influencing e-learning implementation from broader dimensions. This study employed cross section survey design with quantitative approach using questionnaire for data collection. The study finding revealed that technological characteristics, user characteristics, pedagogical characteristics, social attributes and environmental characteristics significantly influence e-learning implementation level. Thus, this study contributes to the understanding of the new factors such as social, pedagogical and environmental which were inadequately addressed in the existing similar e-learning implementation models. Further, both factors were collectively used to develop a model for improving implementation of e-learning in Tanzanian universities and other countries with similar characteristics.

**Keywords:** ICTs, E-learning, website, implementation, Tanzania, Universities

### INTRODUCTION

Website design and optimization has become natural extension on learning in many universities nowadays as it moves learning materials to online in the name of e-learning. The website design and optimization is the practice of constantly improving the online experience through an understanding of learner's needs, to create increasing value for teaching and learning activities (Cook and Dupras, 2004). The said website design and optimization enhances the e-learning for the purpose of facilitating and providing flexibility in teaching and learning activities. By consistently employing principles of effective teaching and learning, educators will unlock the full potential of Web-based in educational context taking the advantages of the concept of e-learning.

E-learning is a complex concept and is characterized into various aspects in multi-dimensions. It is addressed, for instance, in relation to technological, pedagogical, institutional, environmental, social and human dimension. The concept of e-learning is defined differently in various disciplines; most focus mainly on technological back-ups and the way it facilitates teaching and learning process. Sangra and Vlachopoulos (2011) argue that e-learning cannot take place unless there is a simple rationale element of technology, pedagogy, social, environmental, users and administration. Thus, in this study, e-learning is defined as the application of computers with assistive software by both students within the class and for private study; the use of electronic devices for teaching purposes such as interactive whiteboards, data projectors, tablets and so forth; and the use of web based technologies including virtual learning environment (VLE) for communication between students and lecturer, and for storage and access to teaching and learning materials.

E-learning is changing the way in which teaching, learning, and administration of education activities are being conducted in universities (Tossy, 2012; Lwoga & Komba, 2015). For instance it is observed that e-learning cuts down instruction time by up to 60% (Pappas, 2013). In the same vein, it was estimated that about 46% college students are taking at least one course online in Middle East countries (Shivaraji *et al.*, 2013). In addition a recent study conducted by Britain's Open University has found that e-learning consumes 90% less work in teaching and learning than traditional courses (Zhu & Mugenyi, 2015). Further, Al-adwan & Smedley (2012) argue that e-learning offers flexibility in terms of space and time of delivering or receiving learning materials. For instance, Allen and Seaman (2008), in their 2007 survey of US universities, show a 12.9% growth rate for online enrollments compared with 1.2% for overall student population. According to a report released by IBM, utilization of e-learning tools and strategies in UK universities has potentially boosted productivity by up to 50% (Pappas, 2013).

In Africa context, the report by Bagarukayo and Kalema (2015) on the extent of uptake of e-learning in learning in HEIs in South Africa only 2.15% learners never or rarely used a computer to undertake any of the 18 computers based learning activities. In addition, Kasse and Balunywa (2013) in their study conducted in Uganda, the results indicated that e-learning had facilitated delivery of learning materials by 80% compared to

traditional method. However, this study further indicates that e-learning is not fully implemented and utilized effectively in developing countries.

Despite the use of e-learning is growing in universities and colleges globally but the successful e-learning implementation is still a challenge in developing countries, particularly Tanzanian universities (Kahiigi *et al.*, 2008). There is inadequate coverage of factors in various existing models for successful implementation of e-learning in developing countries (Bourlova and Bullen, 2018). Thus, there are still concerns however, regarding the way e-learning has been implemented as evident in universities, Tanzania in particular (Van der Klink and Jochems, 2004; Kahiigi *et al.*, 2008; Munguatosha *et al.*, 2011). Thus, understanding the role and benefits of e-learning, this study aims at investigating the factors influencing e-learning implementation taking on board factors from wide dimensions.

## RELATED LITERATURE REVIEW

Several studies have been cited various factors that influence e-learning implementation within education context. These factors include technological characteristics (Njenga, 2011 and Munguatosha *et al.*, 2011), user characteristics (Taha, 2014; Ordonez, 2014), pedagogical attributes (Anderson & Groönlund 2009; Mtebe and Raisamo, 2014), institutional characteristics (Tarus and Gichayo, 2015; Madar and Wills, 2014; Khan, 2005; Dabbagh, 2005), social attributes (Fresen, 2010; Busaka *et al.*, 2016) and environmental characteristics (Teo, 2011; Zhu and Mugenyi, 2015; Yew and Jamblian, 2015). However the applicability and its influence on e-learning implementation vary depending on the potential adopters and their unique context of application and the type of innovation. These factors have been considered in terms of their basic characteristics as reviewed in the next subsections.

### Technological characteristics

Njenga (2011) conducted a study on e-learning employing the theory of DOI and UTAUT. The findings revealed that factors such as perceived usefulness, self efficacy, demonstrability, perceived ease of use complexity, compatibility were factors influencing e-learning implementation positively. Munguatosha *et al.* (2011) studied social networked learning adoption in universities in Tanzania employing Vygotsky's social development theory. The findings indicated that those ICT infrastructures and system interactivity were among the technological characteristics found to affect the social networked learning adoption and implementation. However, there are no common technological characteristics in literature to influence e-learning implementation (Njenga, 2011). It is therefore that e-learning as one of educational technology need to be effectively implemented and not relatively complex to avoid users 'resistance to use.

Ndonje (2013) conducted a study on e-learning adoption in Tanzania pointed out that the technological characteristics includes complexity; compatibility and relative advantage. The study employed the theory of DOI to explain the causal chain of the constructs used. The findings were found to have very high significant influence on e-learning implementation. Contrary, Sanga (2010) did a study to evaluate e-learning for better implementation in HLLs using grounded theory. The findings shown that it is significantly to select the e-learning system with characteristics such usability, maintainability and deployability for boosting user satisfaction and acceptance of the e-learning system. However, it argued that evaluating the e-learning is a common problem and complex. This lead into a question about the quality e-learning characteristics should be considered for best e-learning implementation in a specific context.

### User Characteristics

It is widely acknowledged that user characteristics can influence the way e-learning can be implemented, perceived, and used in educational context. Taha (2014) conducted a study to investigate the factors for e-learning implementation in secondary school in the Kingdom of Bahrain employing DOI theory. The findings reveal that student characteristics (computer skills, motivations, and self efficacy); teachers characteristics (attitudes, control of technology and pedagogy, and teaching style); technological (quality and effectiveness of infrastructure); design and content (perceived ease of use, quality content) influence significantly e-learning implementation. Ordonez (2014) on the study conducted for predicting international critical success of e-learning by comparing in four countries including China, Spain USA, and Mexico. The finding reveals that from learner point of view course design, learning content, prior knowledge are significant predictors in learner's success in using e-learning. On instructors' point of view he further argued that course design, instruction, learning platform, learning interaction, and learning content are factors affecting an effective online teaching and learning process. Park (2009) found user attitudes towards e-learning significantly influence e-learning adoption and implementation. Similarly, Zewayed (2012) studied users' adoption of e-learning among 926 secondary schools in Bahrain and found that self efficacy and motivation were critical factor of e-learning implementation.

Contrary to the above arguments, Dowling *et al.* (2003) pointed out that despite the claims that factors related to users improves e-learning implementation for education quality, but only for specific forms of collective assessment. Akkoyuklu and Soylu (2006) revealed that factors related to users can not simply support e-learning implementation in the absence of supporting social interactions. The most noticeable criticism of e-learning implementation and use is the complete absence of vital factor such as social interactions, not only between learners and instructors, but also among colleague learners (Al-adwan & Smedly, 2012). In general, for any technology to be valuable, it should be appropriated into particular user characteristics in relation to other supporting factors such as pedagogical and social attributes.

### **Pedagogical Attributes**

Pedagogical attributes play crucial role in influencing implementation of e-learning to improve accessibility, efficiency and quality of teaching and learning. Tarus and Gichayo (2015) affirmed quite clearly users' skills on e-learning; adequate and quality e-learning content are important pedagogical attributes which significantly influence successful e-learning implementation. Mtebe and Raisamo (2014) indicated out that quality and appropriate course contents are determinants of the e-learning implementation. Providing pertinent training to e-learning users particularly lecturers, enables them develop quality e-learning content which has positive effect on students' satisfaction towards the e-learning system use. Similarly Khan (2005) postulates that pedagogical are one of the key factors that influence directly the e-learning implementation. However in practice, e-learning is used as add on functions in most universities in developing countries without integrating it with pedagogical features. The essence is that learning involves teaching by considering course curricular, contents and teaching strategies as these are pedagogical attributes.

Anderson & Gro'nlund (2009) argue that pedagogical attributes need to be clearly stated and considered in successfully implementing e-learning. Ndonje (2013) found that as e-learning is quite different from traditional settings; pedagogical attributes need to be designed specifically to fit the e-learning in order to influence significantly its implementation. The empirical studies indicate that one of the causes of failure of many e-learning projects in educational context is due to resistance to change among e-learning users (Njenga & Fourie, 2010). This attributed to inadequacy considering pedagogical issues when implementing e-learning. In this regard pedagogical attributes with their focus in teaching and learning, are inevitable when planning to integrate any technology in educational context.

### **Institutional Characteristics**

Institutional characteristics often are major factors for successful implementation of e-learning implementations. It is thus widely acknowledged that clear defined institutional characteristics, may lead to effective e-learning implementation in education context. Studies (Tarus and Gichayo, 2015; Njenga, 2011; Madar and Wills, 2014; Khan, 2005; Dabbagh, 2005) have confirmed theoretical and empirical facts of a significant influence of institutional characteristics in the success of e-learning implementation. For example Tarus and Gichayo (2015) studied influence of pre-condition factors on e-learning implementation among 525 respondents in Kenya universities. The findings revealed that institutional characteristics had significant influence on e-learning implementation. (Njenga, 2011) investigated factors influencing e-learning adoption and use in Eastern and Western using exploratory design. The findings show that institutional characteristics had significant contribution to e-learning implementation. .

Khan (2005) found that institutional characteristics such as budget, commitment, constructive communication and management support have significant influence in e-learning implementation. Similarly, Rogers (2003) revealed that constructive communication between the various stakeholders within institutions, significantly influence on adoption and implementation of any innovation. Munguatosha *et al.* (2011) elaborated through their findings that self-efficacy, reliable technical and administrative support, infrastructure, system interactivity, adequate budget, accountability and flexible institutional structure were the factors found to affect the e-learning implementation. These findings demonstrates that in the absence of institutional characteristics, the e-learning implementation in education remain elusive. However, in practice institutional characteristics such as budget and commitment towards implementation of e-learning are inadequate in most universities. Thus, the institutional characteristics have the potential to improve formal and informal activities related to e-learning implementation to support education activities.

### **Social Attributes**

E-learning through social attributes has a great potential to facilitate not only education activities but also social networks. In this case, social attributes in turn contributes not only motivation to users but also better quality of learning environment among students and lecturers. It has seen as a means to decrease the feeling of isolation and enable social inclusion among learners when effectively implemented. Findings from several researchers

explained the influence of social factors in e-learning implementation (Khan, 2005; Fresen, 2010; Busaka *et al.*, 2016). Khan (2005) argues that availability of that social interaction, cultural interaction and increase motivation influence the e-learning implementation particularly the use of e-learning in teaching and learning. Munguatosha *et al.* (2011) insists that the application of social networking sites like twitter, blogs and so on provides opportunities for user socialise, chatting and exchange their ideas while learning. This in turn increase positive attitude towards e-learning adoption and use. According to social constructivist learning theory (Vygotsky, 1978) applicability social networking sites enable universities to achieve social aspects of learning users to gain status or image. However, in most cases it happens that e-learning users lack appropriate training and awareness to understand the essence of using social e-learning platforms in teaching and learning context.

The findings from the study conducted by Sridharan *et al.* (2008) discovered that among the critical success factors on implementation of e-learning in HLIs is social attributes as this factor provides productive relationship among users, discussion groups and collaborations. Khan (2005) and Ghinea (2013) argue that lack of consideration of social factors leads to a great challenge that influence negatively e-learning implementation. Taha (2014) conducted a research on investigating the success of e-learning in Secondary Schools: the Case of the Kingdom of Bahrain using quantitative method. The findings indicated that social presence in terms of subjective norm was found influential factor either directly or indirectly on e-learning implementation. Similarly the analysis of the survey from several findings indicates that users such as students and lectures are fully aware of the significance of social interaction in supporting successful e-learning implementation (Malik, 2010; Mbarek and Zaddem, 2013). It is argued that e-learning implementation in relation to social attributes have two perceptions, student's interaction with learning materials and technologies is one view and the social activity of exchanging and generating ideas is another view (Nunes & McPherson, 2007). Thus, these views necessitate attentions and they required to be considered prior to implementation of e-learning through e-learning training and workshops.

### **Environmental Characteristics**

Environmental contributes significantly in e-learning implementation. It is seen to influence e-learning implementation differently, as general factor as well as specific factor. For instance, Yew and Jumbigan (2015) conducted a review of studies and discussed critical factors on e-learning implementation in Malaysia. They argue that environmental factor includes e-learning characteristics such as hardware and software necessary required for the operationalisation of e-learning implementation. In addition, Zhu and Mugenyi (2015) conducted a study employing SWOT analysis methodology on the integration of e-learning in Ugandan and Tanzanian universities. The findings revealed other factors beyond the above mentioned and found that internet connectivity, bandwidth, sustainable electricity are general environmental characteristics significantly influence e-learning implementation.

However, Teo (2011) argue further that inadequacy of technical support contributes significantly to failure of e-learning implementation; the findings revealed that training skills and administrative support are specific important factors in influencing e-learning implementation by surpassing lecturers to use the technology effectively. Yew and Jambulingan (2015) explain that support from ICT units or department such as the IT specialist to design are specific factors significantly helps the lectures to effectively use the e-learning as it might be very difficult for them to catch-up through only training. For that case computer hardware and software (IT gadgets) are necessary available to e-learning users for success e-learning implementation. This argument shows that in absence of sufficient ICT infrastructure as the basic and pre-requisite characteristics absolutely dishearten e-learning implementation in educational activities.

Thus, factors influencing e-learning implementation are not unified globally as each study has conducted in different contexts, using different methodologies to investigate the e-learning implementation. This makes the level of e-learning uptake definitely differ from one context to another. Njenga (2011), Painter-Marland *et al.* (2003) and Rogers (2003) conclude that although studies on implementation of e-learning explain various factors, it is revealed that these factors vary depending on the type of innovation, the potential adopters and users and their unique context of implementation. Besides, these factors are mainly limited on technological and institutional dimensions. Social, environmental and pedagogical issues are inadequately addressed in most of studies reviewed. Further, there are still unnoticeable empirical evidences in most recent studies in Tanzanian universities regarding factors influencing e-learning implementation level (Nagunwa & Lwoga 2012; Sanga *et al.*, 2013; Kisanga & Ireson, 2015). To cover this empirical knowledge gap, this study determined factors influencing e-learning implementation level from wide dimensions (technological, institutional, pedagogical, environmental, social and users) specifically in the context of Tanzanian universities.

## CONCEPTUAL FRAMEWORK DEVELOPMENT

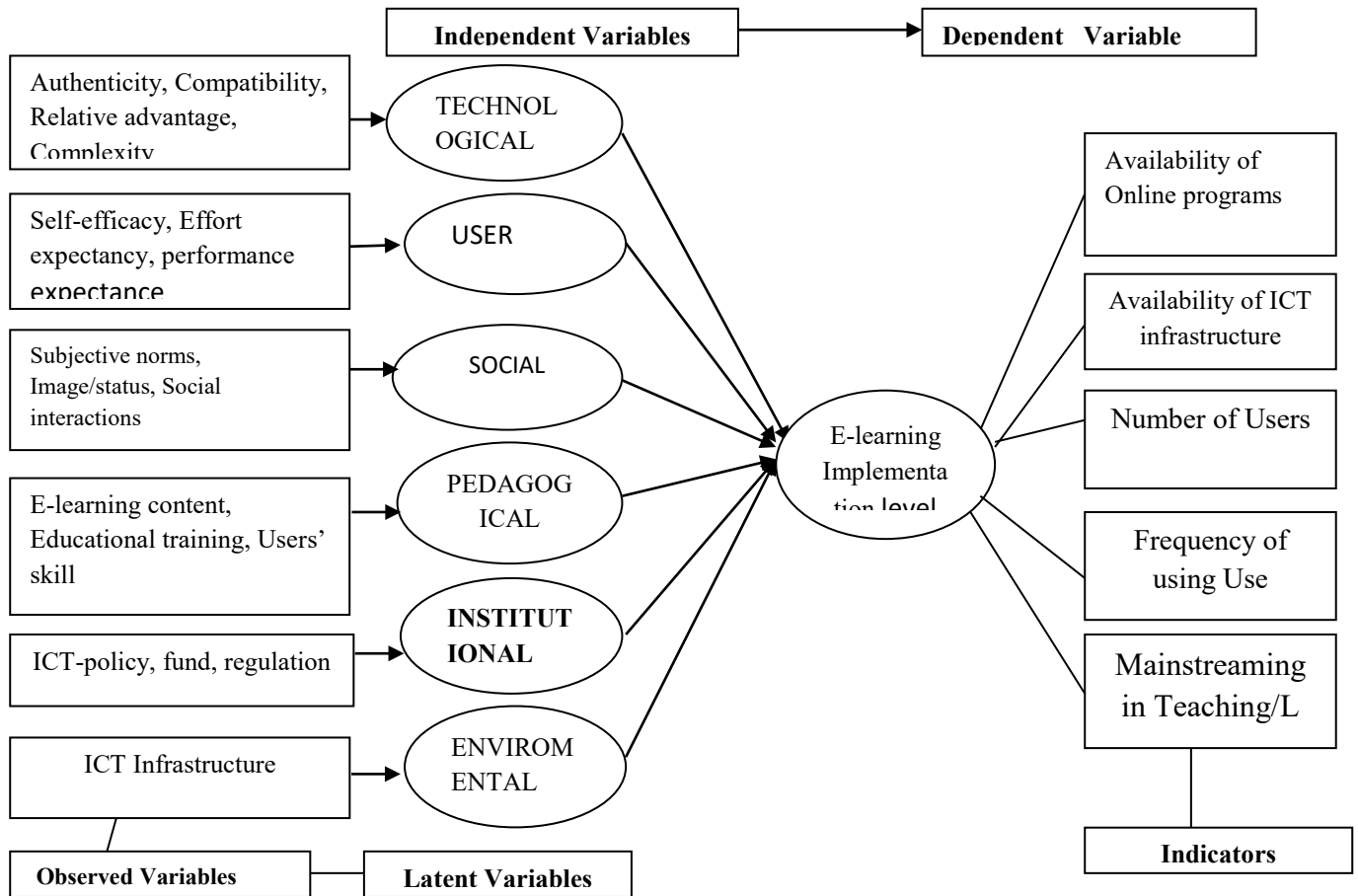
Technology adoption and implementation theories are commonly used in many studies that investigate factors influencing e-learning implementation. Several theories have been developed to explain adoption and use of technology. This study used the UTAUT (Venkatesh et al., 2003) over other models and theories to better explain the e-learning implementation and usage in Tanzanian universities context. UTAUT was employed among other theories because of its comprehensiveness and higher degree of explanatory compared to other similar theories and models in technology acceptance and use (Venkatesh et al., 2003). Further, UTAUT has rarely been applied in the e-learning implementation and use, especially in the context of developing country including Tanzania. UTAUT, therefore, seemed an applicable theory to determine factors influencing e-learning implementation and usage level in Tanzanian universities.

The comprehensiveness of UTAUT presents a unified view to better explain the e-learning implementation level in terms of user acceptance and use .due to the following technology acceptance models and theories: Theory of Reasoned Action (TRA); Motivational Model (MM); Theory of Planned Behaviour (TPB); Technology Acceptance Model (TAM); Combined TAM and TPB (C-TAM-TPB); Model of PC Utilization (MPCU); Innovation Diffusion Theory (IDT); and Social Cognitive Theory (SCT) (Venkatesh et al., 2003). UTAUT comprises four core constructs that play a significant role as direct determines user technology acceptance and usage behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions which follow under technological and user characteristics, as well as Social attributes. The conceptual framework for this study was formulated based on UTAUT, and it is comprised of six latent variables (factors or construct) with their observed variables as illustrated in Figure 1. The original UTAUT was modified by adding other three construct (i.e. pedagogical attributes, institutional and environmental characteristics). Various studies found that institutional, pedagogical and environmental as important factors to better explain the e-learning implementation and use (Tarus and Gichayo, 2015; Zhu and Mugenyi, 2015; Khan, 2005). However, these factors vary depending on the type of innovation, the potential adopters and users and their unique context of implementation (Njenga, 2011).

This study provides an input to stakeholders and researchers in the areas of e-learning. Research works are embarked upon with a view to extending the frontier of knowledge. The present study was therefore carried out with this same purpose, especially in the field of e-learning. It has, therefore, contributed to the extension of the frontier of knowledge as follows. The study has shown the predictive power of extending the variables and methodologies employed as empirical evidence based on the factors influencing e-learning implementation. Thus, this study determined the factors influencing e-learning implementation in Tanzanian universities. The following were the specific research questions of the study:

1. To what extent do technological characteristics influence implementation of e-learning?
2. To what extent do user characteristics influence implementation of e-learning?
3. To what extent do pedagogical characteristics influence implementation of e-learning?
4. To what extent do institutional characteristics influence implementation of e-learning?
5. To what extent do social characteristics influence implementation of e-learning?
6. To what extent do environmental characteristics influence implementation of e-learning?





**Figure 1: A conceptual Framework**

## METHODOLOGY

### Study Area and Participants

This study was carried out in eight public and private universities purposively selected from among 30 universities in Tanzania. These were the University of Dar-es Salaam, Sokoine University of Agriculture, State University of Zanzibar, University of Zanzibar, University of Iringa, the Open University of Tanzania, St. Joseph University of Tanzania and Mbeya university of Science and Technology. These are the Universities which have been invested in ICT infrastructure and have implemented e-learning platforms and facilities to enhance its teaching and learning activities. The use of purposive sampling techniques was to ensure selection of sample of universities with characteristics based on the nature of this study and gather large amounts of information enabled a researcher to generalize the findings. Such characteristics include; nature of the university (such as biological sciences, social sciences, technology and comprehensive). Other characteristics include mode of delivery (campus based and distance learning), geographical location (urban and rural), age (old and new) and ownership (private and public). These eight universities had a total population of 58,000 and 6,896 students and academic staff respectively.

### Sampling procedure and Sample size

Proportional stratification sampling technique was used to stratify a sample of 400 of students and academic staff to their subgroups as indicated in Table 1. This study also employed simple random sampling technique to obtain students and academic staff differently from their subgroups randomly with specific size using lottery method. Each member of their subgroups was assigned a number using small piece of paper. These pieces of papers were folded and mixed into a box. Lastly, samples were taken randomly from the box by choosing folded pieces of papers in a random manner. The simple random sampling particularly the lottery method was employed in this study in order to minimize bias from selection procedure and resulted into representative sample. In addition, the population was divided into subgroups in which the lottery method is reliable compared to computer-generated process (random number generator software) (Saunders *et al.*, 2012)

The sample size of each sub-group is proportionate to the population size of the disjoint groups. The sample size of each subgroup was determined by the equation:  $n_h = (N_h / N) * n$ . Where  $n_h$  is the sample size of the sub-group  $h$ ,  $N_h$  is the population size for the sub-group  $h$ ,  $N$  is the total population size and  $n$  is the total sample size adopted from similar existing studies (Trochim, 2006).

Table 1: Show study population and Sample size

CATEGORY						
UNIVERSITY	STUDENTS		ACADEMIC STAFF		Total Population	Total Sample Size
	Population	Sample Size	Population	Sample Size		
UDSM	17,500	103	2350	18	19,850	121
SUA	8,988	53	1500	13	10,488	69
OUT	10,684	63	663	5	11,347	68
SJUT	4,883	29	400	3	5,283	31
UOI	5786	34	850	7	6,636	41
SUZA	2,704	16	330	3	3034	19
ZU	2,544	15	300	3	2,844	18
MUST	4,909	29	503	4	5,412	33
<b>TOTAL</b>	<b>58,000</b>	<b>342</b>	<b>6,896</b>	<b>58</b>	<b>64,896</b>	<b>400</b>

### Data collection Instruments

Data were collected using a structured questionnaire that contained scales to measure e-learning uptake with items ranging from 1 (Strongly disagree) to 5 (Strongly agree). A total of 342 (291 for students and 58 for academic staff) questionnaires were received back which is a response rate of 85.5%.

### Validity and Reliability of instrument and data

To determine the reliability and validity of the study instrument, a pilot study was undertaken at Mzumbe University in Morogoro using a sample of 30 respondents. The reliability of each variable was determined using Cronbach's Alpha and the score was found to be 0.949 which is acceptable (Krishnan and Ramasamy, 2011). In ensuring validity of the variables, the items of the questionnaire were ranked against a review of related literature (theoretical and empirical). Similarly the validity of findings was achieved through CFA which was used to establish the co-variation among observed variable and latent variable. In addition to that, operationalization of variable was done in order to confirm the variables into original sources including concepts from theories and empirical evidence.

### Data Analysis

The collected data was processed and analyzed using the Predictive Analytic Software (PASW). Descriptive analysis was done to obtain the demographic characteristics of respondents as well as means and standard deviations. The data were cleaned and screened to remove some coding errors. Various tests such as, reliability and validity of the data were performed before conducting descriptive and inferential analysis in order to attain the internal consistency of data. The data analysis techniques including factor analysis Structural Equation Modeling (SEM) particularly confirmatory factor analysis (CFA) in this study were employed to perform analysis based on the requirements and the nature of this study as presented as follows:

**Factor analysis (FA)** is a statistical approach that is used to analyse interrelationships among a large number of variables and confirm these variables in terms of their common underlying dimensions (Hair *et al.* 2006). The reason for employing FA are follows: First, this study have employed variables that are subjected to factor analysis (FA), each has 5 observations, as recommended to be at least 5-10 observations (Comrey & Lee, 1992). Second, the study was used the sample size of 400 in which the recommended sample size for CFA is at least 300. Third, it was employed to reduce the number of variables by creating new composite variables for each factor (Isaga, 2012).

**Confirmatory factor analysis (CFA)** is a measurement model which determines the correlations among observed variables as well as latent variables. Being part of Structural Equation Modeling (SEM), the confirmatory Factor Analysis establishes the Measurement Model which specifies the number of observed variables. It confirms how each latent variables (Factors) relate to its observed variables (indicators) and confirm their relationship by explaining to how much observed variables contributes to their respective latent variables. The main focus was to ascertain the number and nature of latent variables that describe for variation and co-variation within a couple numbers of observed variables. In this study, confirmatory factor analysis (CFA) is used to determine the factors that influence the e-learning implementation in Tanzanian universities.

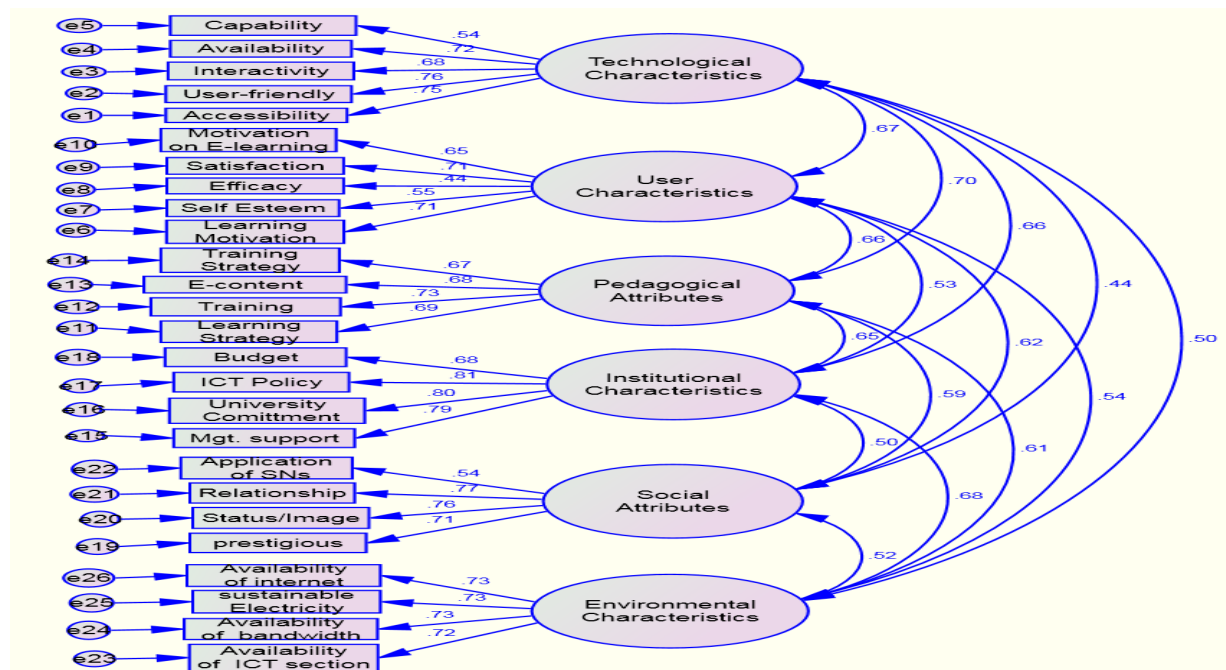
**Structural Equation Modeling:** Based on the established relationships of independent and dependent variables in this study, the study also aimed at developing and validating e-learning and implementation model. This modeling process was including the factors influencing e-learning implementation from various dimensions. The latent variables and their observed variables were validated, this include: technological, pedagogical, institutional, users, social and environmental. Structural Equation Modeling (SEM) particularly path diagram was used to build the model with six different structural models based on technological, institutional, pedagogical, user, social as well as environmental factors

**RESULTS PRESENTATION**

This section presents the summary of analysis results using confirmatory factor (CFA) analysis and structural equation modeling (SEM).

**The measurement Model developed using CFA**

The section presents the measurement model as depicted in Figure 2 below. The results show how much observed variables contribute to latent variables confirmed by CFA to make model fit by examining extent of interrelationship and co-variation among the latent constructs. The latent constructs (factors) confirmed include; Technological, Pedagogical, User, Institutional, Social and Environmental as indicated by oval while observed variables are those represented by rectangles.



**Figure 2: Measurement Model using CFA (Analysis of field data, 2017)**



The findings in Figure 2 above shows that all observed variables have loaded above 0.6 which indicate high contribution to unobserved variables with acceptable level of convergence validity. This has been supported by (Barclay *et al*, 1995) that, the standardized factor loading for reflective indicator is 0.7 but 0.5 is considered to be acceptable. Looking further the model it was deduced that there is good relationship among latent variables as all covariance were above 50% except that of between social attributes and Technological characteristics which was 44%. As supported by Fornell and Larcker (1981) that the covariance above 50% is acceptable for convergence validity of a model. Table 2 below complements the results in Figure 2 above.

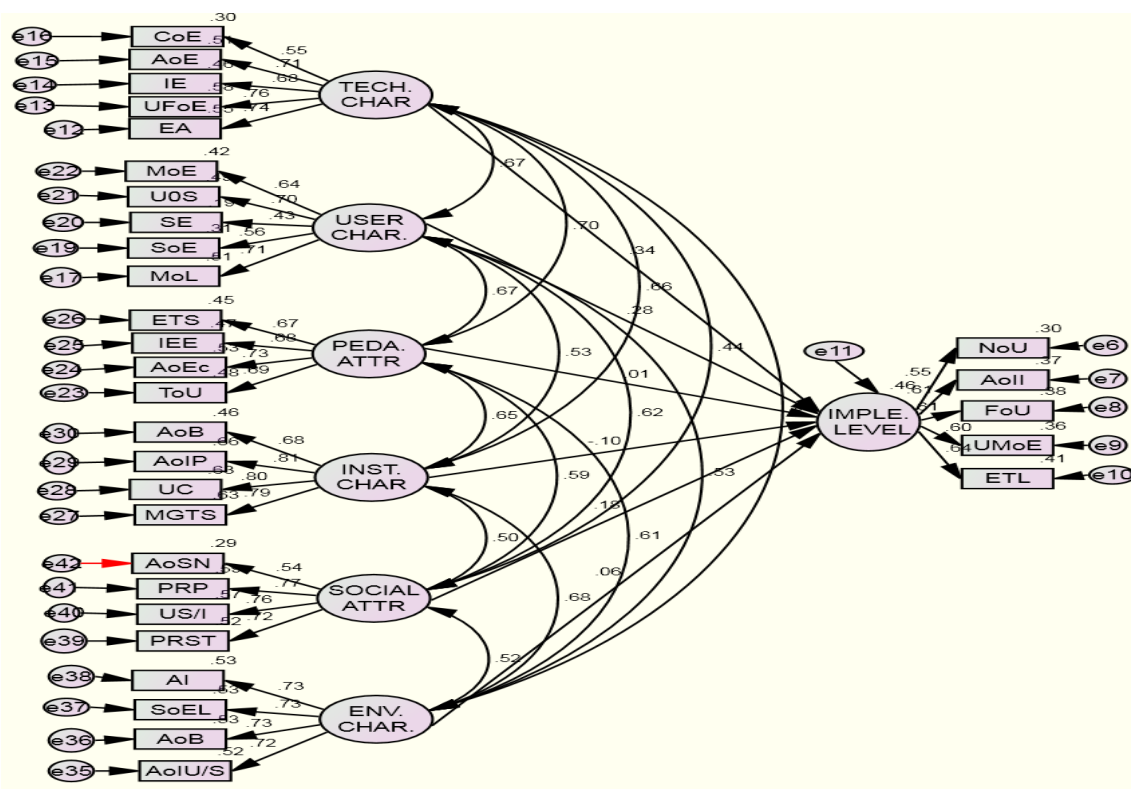
From Table 2, it is revealed that the model of fit as the RMSEA is in between 0.6 to 0.8 as suggested by Hu and Bentler (1999) and Yu (2002) for continue and categorical data. Further the GFI, AGFI were 0.9 and 0.83 respectively which are acceptable. The P-value is significance with 0.000 as recommended. However, the PCLOSE is not acceptable as it is too small compared to 0.5 recommended. Therefore the rest indices indicate that the model is better to explain the interrelationship between latent variables and measurable indicators as well as the correlations among the latent variables. In this case there is no need of modification of indices.

**Table 5.29: Show Model of fit Summary**

Model	NPAR	CMIN	DF	P	CMIN/DF	RMSEA	PCLOSE	GFI	AGFI
Default model	67	587.085	284	.000	2.067	.061	.006	.866	.834
Saturated model	351	.000	0					1.000	
Independence model	26	3509.838	325	.000	10.800	.184	.000	.269	.211
Recommended value for model fit: GFI, AGFI, NFI, RFI, IFI, TLI and CFI close to 1, $0 \leq$ RMSEA $\leq$ 0.1 (Hooper, Cooughlan & Nullen, 2008; Kline, 2005)									

### The E-learning Implementation Model developed using SEM

This section presents the result of the overall model in path diagram built by SEM to indicate the relationship between the latent variables as independent variables and e-learning implementation level as dependent variable. The model developed has two parts; the measurement model and structural model. The results show exactly the extent to which each factor significantly influences positively the e-learning implementation level among Tanzanian universities. The determined factors and their relationships in a model were considered as a best way of implementing e-learning among Tanzanian university. Based on the findings from section above, the overall model is built as shown in Figure 3.



**Figure 3: E-learning Implementation Model: Analysis of field data (2018)**

**Keywords:** CoE – Capability of E-learning; AoE – Availability of E-learning platforms and facilities; IoE - User interaction on E-learning; UoE - User friendly on using E-learning; EA – E-learning Accessibility; MoE – Motivation of users to use E-learning; UoS – User satisfactions towards using e-learning; SE – Self efficacy of users towards e-learning; SoE – Self esteem on using e-learning; MoL – User motivation on learning/teaching using e-learning; ETS - Availability of e-learning training strategies; IEE - Integrations of E-learning and E-content; AoEc – Availability of e-contents; ToU - Availability of user training on using E-learning; AoB - Availability of budget for e-learning; AoIP – Availability of ICT policy; UC – University commitment towards e-learning; MGTs – Management supports e-learning; AoSNs – Availability of Social Networking sites; PR – Productivity relationships among users; US/I – Status/Image of users; PRST – Prestigious of users towards using e-learning; AI - Availability of Internet connectivity; SoEL – Sustainability of electricity; BA – Bandwidth availability; AU/S – Availability of ICT units/sections

The findings from the model presented in Figure 3 above suggest that all observed variables contribute in each of unobserved variables (factors) as they have loading weight above 0.4. According to Hair et al. (2014), the recommended factor loading for a good relationship between observed and an observed variable is at least 0.3. For this case all observed variables are good measure of unobserved variable as shown in Figure 3. It has been deduced further from the findings that all unobserved (Latent variables) have acceptable correlation among them. According to Anderson & Gerbing (1988), Bagozz and Yi (1988) and Coromina (2014) suggest that correlation between each item and its construct is at least 0.5 while that among items from the same construct is at least 0.3. This is an evidence of reliability among construct used to influence the e-learning implementation level as the correlations among each other are at least 0.4.

Moreover, based on the information from the left part (measurement model) of the developed and tested model in figure 3, the findings suggest that all independent variables have relationship with the dependent variable (E-learning Implementation level). This has been attributed to the fact that the standardized regression weight for (independent variables) Technological, User, Pedagogical, Institutional, Social and Environmental constructs were considered. Since loading weights represent the amount of change of the dependent variable (e-learning implementation level) per single unit of change of each independent construct. These results suggest that, for every single standard deviation of increase in technological, user, pedagogical, social and environmental construct, e-learning implementation level is increased by 0.34, 0.28, 0.01, 0.18 and 0.06 respectively. Surprisingly, the result further revealed that for every single standard deviation of increase in institutional construct, e-learning implementation level is decreased by -0.1. It is acknowledged therefore that the results

evidence the existence of model of fitness. Table 3 supplement to the above presentation of results by explaining the model fit summary.

**Table 3: the E-learning Implementation Model fit summary**

Model	CMIN	DF	P-VALUE	CMIN/DF	GFI	AGFI	RFI	NFI	IFI	RMSEA
Default model	803.839	413	.000	1.946	.900	.820	0.780	.804	.890	.057
Saturated model	.000	.000								0.164
Independence model	4097.104	465	.000	8.811	.264	.264			0.00	
Recommended value for model fit: GFI, AGFI, NFI, RFI, IFI, TLI and CFI close to 1, $0 \leq$ RMSEA $\leq$ 0.1 (Hooper, Cooughlan & Nullen, 2008; Kline, 2005)										

**Source: field data (2018)**

From the results presented in Table 3, the findings indicates that all values such as GFI, AGFI, RFI, NFI, RMSEA and P-values qualify to explain the model fit based on the reasonable sample size used for SEM analysis in this study which is 291 and the criterion of various indices. For instance Ho and McDonald (2002) suggest that if the sample size is in the range of 237 -330 then the acceptable root mean square estimate approximation (RMSEA) should be in the range of 0.05 - 0.08 and the recommended P-values for significance are .000. On the same vein the value of indices such as GFI, AGFI, NFI, RFI and IFI should be close to 1 (Hooper *et al.*, 2008; Kline, 2005). The findings therefore show that the mode of fit as all indices are acceptable and the p-values indicate significance at 0.00.

## DISCUSSION AND RECOMMENDATION

Ideally, one of the issues in recent years that universities should consider as part of education reform is e-learning implementations. Various studies argued that e-learning implementation need (see in Njenga, 2014; Tarus *et al.*, 2015; Tarus and Gichayo, 2015) careful attention and a great effort as preconditions for efficient and effective implementation. Cox (2010) argues that, e-learning is to be successfully adopted in universities if and only if students, academic staff, ICT experts and management must be considered in the process of implementation. Notwithstanding the notable importance of e-learning implementation, factors to guarantee successful and effective implementation process are non-uniform. The available factors influencing e-learning implementation depend on the type of technology, potential adopters and their unique context (Rogers, 2003). In this case, the study findings addressed the objective of the chapter and the discussion of the study findings are based on the following determined factors and its observed variables.

### Technological Characteristics

The findings in Figure 5.2 show further that: Technological characteristics influence the number of e-learning users (as 1 standard deviation of technological characteristics causes 0.72 of standard deviation to increase the number of e-learning users). Technological characteristics influence the frequency of using e-learning (as 1 standard deviation of technological characteristics causes 0.44 standard deviation to increase frequency of using e-learning). Technological characteristics influence availability of ICT infrastructure (as 1 standard deviation of technological characteristics causes 0.69 standard deviation to increase the availability of ICT infrastructure). Technological characteristics influence motivation of e-learning users (as 1 standard deviation of technological characteristics causes 0.41 standard deviation by increasing motivation of e-learning users). Availability of e-learning is one thing, but should be easy and user friendly as well as useful in their learning and teaching. After all these characteristics, then e-learning would be accessible at a great rate and this finding is similar to (ESIB, 2003; Tarus and Gichayo, 2015). Tarus and Gichayo (op.cit) found that, for example lecture halls and halls of residence should have network and Internet connectivity to facilitate accessibility to e-learning. Further

example, availability and capability of LMS platform as an imperative tool for student administration, tracking, and delivery of e-learning education courses should be user friendly and interactive. While ESIB (2003) who also established the same that the institution providing e-learning must make sure that all facilities and platforms required are available and adequate, capable and interactive, including internet connectivity and computers.

### **Institutional Characteristics**

Findings of this study indicate that the factor loadings for e-learning budget, availability of ICT policy, university commitment and management support on e-learning activities were above 0.3. This implies that the items were very good measures of institutional construct. The results in Figure 5.12 show further that: Institutional characteristics influence the number of e-learning users (as 1 standard deviation of user causes 0.73 standard deviation to decreasing the number of e-learning users). On the other hand, institutional characteristics influence the frequency of using e-learning (as 1 standard deviation of institutional construct lowers the frequency of using e-learning by 0.48 of standard deviation). Also institutional characteristics influence the availability of ICT infrastructure (as 1 standard deviation of institutional construct causes 0.65 standard deviation by decreasing the availability of ICT infrastructure). Institutional characteristics influence motivation of e-learning users (as 1 standard deviation of institutional characteristics causes 0.44 of standard deviation by lowering motivation of e-learning users).

These findings are contradicting with the findings of Awidi (2008), Mapuva (2009), Munguatosha *et al.* (2011) and Tarus and Gichayo (2015) who found that there is significant influence of institutional characteristics on e-learning implementation level. For instance, the findings by Tarus and Gichayo (2015) show that ICT Policy provides a guideline and direction for the e-learning implementation in universities. Their findings insist that sufficient budgetary distribution was critically required to support implementation activities such deployment and maintenance of the e-learning platform and facilities and training of users on how to use e-learning. Awidi (2008) points out the same that the institution must have evidently defined strategic plans that speak out ICT policies that support e-learning implementation strategies. In line with prior research findings, Mapuva (2009) also argue that commitment from institutional management is also found to be influential factor, due to their decision based on facilitating implementation within their universities. The difference of the current findings to previous findings is in the due that the current study use heterogeneity samples to gather as much as insight information regarding e-learning implementation in the eight universities in Tanzania. However the previous similar studies employed homogeneous sample which led to biasness and inadequate information based on implementation of e-learning.

### **Pedagogical characteristics**

The findings in Figure 5.4 show that the factor loading for e-learning and learning strategy, e-learning training, and integration of e-learning and e-content, training on e-learning strategies were above 0.5 and that the items are very good measure the construct of pedagogical characteristics. The results in Figure 5.4 show further that pedagogical characteristics influence the number of e-learning users (as 1 standard deviation of pedagogical attribute cause 0.72 of standard deviation by increasing the number of e-learning users). Pedagogical characteristics influence the frequency of using e-learning (as 1 standard deviation of pedagogical characteristics cause 0.50 of standard deviation by increasing the frequencies of using e-learning). Pedagogical characteristics influence the availability of ICT infrastructure (as 1 standard deviation of pedagogical characteristics cause 0.63 standard deviation by increasing the availability of ICT infrastructure). Pedagogical characteristics influence the motivation of e-learning users (as 1 standard deviation of pedagogical characteristics cause 0.45 of standard deviation by increasing motivation of e-learning users). Similarly, it is suggested that, in order for user training on e-learning usage to be efficient and effective there should be an e-learning training strategy for guidance. In literature this finding is considered important in e-learning implementation (Mtebe and Raisamo, 2014: Taha, 2014; and Zhu and Mugenyi, 2015).

The findings from the study by MoE in Bahrain (2007) indicated that students prefer e-contents and e-lessons developed by multimedia, which enhance the importance of e-learning in the knowledge acquisition. Mtebe and Raisamo (2014) also found that academic staff should establish excellence course contents that convene planned educational benefits; relevant to learners' knowledge; skills and capability in order to exploit e-learning use, and raise learners' satisfaction with the e-learning. Tarus and Gichayo (2015) cement the same that course quality has positive influence on learners' satisfaction towards the e-learning as well as having positive influence on e-learning use. Taha (2014) indicated that 73.3% of the students in the sample responded out that the integration of e-learning with e-lessons and e-content influenced positively the student's interaction as well as exchange of ideas and skills.

### User Characteristics

The findings of this study show that the factor loading for user confidence, self efficacy, motivation on using e-learning (user experience), motivation on learning, and self esteem on e-learning were above 0.3. The results show that the items are good measures of user characteristics construct. The results in Figure 5.3 show further that user characteristics influence the number of e-learning users (as 1 standard deviation of user causes 0.63 standard deviation to increase number of e-learning users). User characteristics influence the frequency of using e-learning (such that, 1 standard deviation of user construct causes 0.52 of standard deviation by increasing frequency of using e-learning). User characteristics influence availability of ICT infrastructure (as 1 standard deviation of user causes 0.68 standard deviation to increase the availability of ICT infrastructure). User characteristics influence motivation of e-learning users (as 1 standard deviation of technological causes 0.49 standard deviation by increasing motivation of e-learning users).

The findings of this study complement the preponderance of previous researches (Selim 2007; Taha, 2014, Iskander, 2013). Engelbrecht (2005) agrees and goes on to say that user characteristics play vital role in e-learning implementation models, however many models become unsuccessful and ineffective due to lack of appropriate user characteristics in universities. Specifically, findings confirm that users' attitudes (self efficacy, self esteem, motivation on learning and confidence), user motivation (experience) were found to influence significantly success of e-learning implementation (Taha, 2014). The findings by Luskin and Hirsen (2010) reiterate on the finding of this study that there is interrelationship among user characteristics. For instance self-efficacy and motivation towards e-learning usage are two of the mainly relevant characteristics related to user experience, motivation to learn, satisfaction, enjoyment and confidence as an outcome of successful e-learning implementation.

### Social Attributes

Findings of this study indicate that the factor loadings for the application of social networks, productive relationships, status/image and prestige towards e-learning activities were above 0.5. And that the items were good measures of social construct. Findings in Figure 5.6 show further that social characteristics influence the number of e-learning users (as 1 standard deviation of users causes 0.64 of standard deviation by increasing the number of e-learning users). Social characteristics influence the frequency of using e-learning (as 1 standard deviation of social characteristics increase the frequency of using of e-learning by 0.56 of standard deviation). Also social characteristics influence the availability of ICT infrastructure (as 1 standard deviation of users causes 0.61 standard deviation by increasing the availability of ICT infrastructure). Social characteristics influence the motivation of e-learning users (as 1 standard deviation of social characteristics causes 0.54 of standard deviation by raising the motivation of e-learning users).

Previous findings including Munguatocha *et al.*(2011), agree and go on to say that, one variable of social factor such as applicability social networking sites enables universities to achieve social aspects of learning in line with social constructivist learning theory (Vygotsky,1978). For example social software tools facilitate teaching and learning in collaboratively, participative in an online forum, chatting and share relevant contents (Awodele *et al.*, 2009; Alexander, 2008; Ryan *et al.*, 2011). In the same vein, the seventh dimension in Khan's (2001) model addressed the social assortment taking into account different characteristics of variety of users of e-learning such as online learners.

Contrary to the above findings, the findings from the study conducted by Al-adwan and Smedley (2012) indicated that working independently from the lecturer was unpopular. 62% of the students indicated that face-to-face contact with lecturer was a vital part of their learning and improve their status and prestige. Schwartzman (2001) agree and goes further by supporting the findings from the study by Al-adwan and Smedley (2012) that students who continually use e-learning in their learning might face difficulties in creating social productive relationship, their social skills as well as behaviors. Thus, it is reasonable to conclude that social factors were inadequately considered in e-learning implementation in many studies. Likewise there are unavailable empirical studies conducted in e-learning implementation in the context of Tanzanian universities addressing social issues. This study fills this knowledge gap by including social factors as a contribution in the developed model for implementing e-learning in Tanzania context

### Environmental Characteristics

Findings of this study indicate that the factor loadings for availability of ICT sections/directorate, availability bandwidth, sustainability of electricity, availability of internet connectivity were above 0.5. And that the items were very good measures of environmental construct. The findings in this study show further that environmental characteristics influence the number of e-learning users (as 1 standard deviation of environmental causes 0.68 of



standard deviation by increasing the number of e-learning users). Environmental characteristics influence the frequency of using e-learning (as 1 standard deviation of environmental characteristics increases the frequency of using of e-learning by 0.53 of standard deviation). Also environmental characteristics influence the availability of ICT infrastructure (as 1 standard deviation of environmental causes 0.63 standard deviation by increasing the availability of ICT infrastructure). Environmental characteristics influence motivation of e-learning users (as 1 standard deviation of environmental characteristics causes 0.49 of standard deviation by raising motivation of e-learning users).

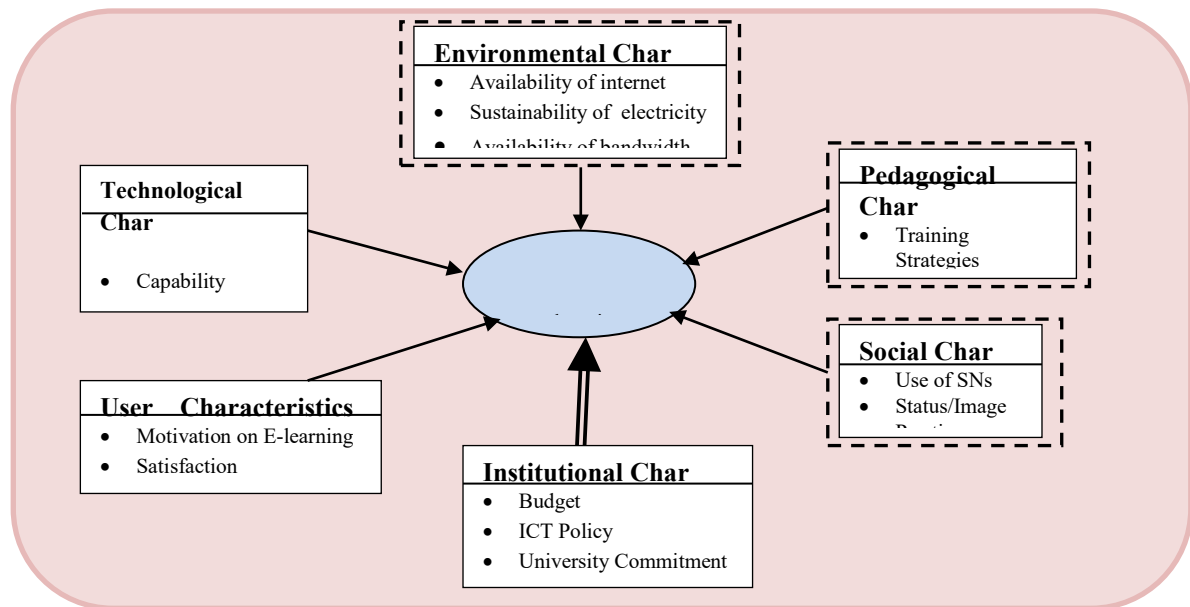
The previous researches and studies conducted on e-learning implementation supported these findings (Henderson, 2005; Kavaliauskierie, 2011; Othman & Musa, 2012; Amandu *et al.*, 2013; Zhu and Mugenyi, 2015). Zhu and Mugenyi (2015) insist on top of the findings above that implementation of e-learning relies on many factors including computer and Internet availability and accessibility as well as cross-cutting issues like electricity. Berhanu (2010) agrees and goes on to caution that implementation of e-learning without recognizing cross cutting issues and providing a conducive environment of ICT infrastructure and efficient support jeopardize e-learning implementation level. Othman & Musa (2012) support by saying that availability of high bandwidth leads to reliable access of e-learning platforms and facilities in place and accounts to be crucial factor in e-learning implementation. Despite the important contributions from environmental issues in e-learning implementation still environmental factors were inadequately exhausted in various e-learning implementation studies. Further there are limited researches conducted with empirical evidence which have pointed out the influence of environmental characteristics particularly the ICT infrastructure on e-learning implementation level in developing countries, Tanzania in particular. This study therefore addressed environmental characteristics to fill this gap by contributing to the body of knowledge.

#### **FUTURE RESEARCH DIRECTION**

In this study we attempted to establish the model for its implementation in Tanzanian universities. The research design, therefore, was specifically focused to address this specific Tanzanian universities problem. Thus, the findings in this paper may not apply to other universities in other countries or even to apply to other institutions such as colleges and secondary schools in Tanzania context. The areas that are not at the center of this study's design are good avenues for future research. These are, among other: first, the applicability of the findings in this study to teachers training colleges. Second, in this study it was revealed that e-learning implementation level in Tanzanian universities has been influenced by factors such as technological, users, institutional, environmental characteristics, social and pedagogical characteristics. Thus, future studies may focus on comparing e-learning implementation levels among Tanzanian universities to reveal the reasons of their differences. Fifth, in this study theoretical model was developed to explain the implementation of e-learning in Tanzanian universities. However, this model was not tested empirically. Future study should test the model using different data from other areas which are not part of the focus of this study.

#### **CONCLUSION**

The chapter has addressed the potential of applying a model in Figure 7.1 in improving the e-learning implementation in Tanzanian universities. It has addressed the critical factors from wide dimensions towards successfully e-learning implementation. E-learning implementation in Tanzania is done in ad-hoc basis thereby lacking adequate factors described in a model in Figure 7.1 as a base for supporting e-learning implementation. Similarly, the paper has demonstrated how these interrelated factors significantly influence e-learning implementation level. On the critical factors which revealed significantly to influence e-learning implementation are from Technological characteristics, Users characteristics, Pedagogical attributes, Institutional characteristics, Social attributes and Environmental characteristics.



**Figure 7.1: A model for E-learning Implementation**

**Descriptions:** In the model presented in figure 7.1, direct single arrows show positive influence of factors on e-learning implementation. Double arrow shows negative influence of institutional factor on e-learning implementation. The dotted rectangle boxes indicate the new factors contributed by this study which found to influence significantly e-learning implementation. However, these factors were not considered in previous existing similar e-learning implementation model reviewed in chapter three. This study also observed that there is inadequate comprehensive theory which conceptualizes the phenomena (e-learning implementation) and lack of adequate institutional characteristics to support e-learning implementation in Tanzanian universities. Therefore, the interrelated influential factors presented in a developed model will support and improve e-learning implementation in Tanzanian universities and other universities from countries with similar characteristics.

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