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### RESEARCH ARTICLE

#### MEASURING E-LEARNING SUCCESS WITH THE EXTENSION OF TECHNOLOGY FACTOR IN DELONE & MCLEAN IS SUCCESS MODEL.

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#### Abstract

This paper aimed to provide a framework to find the effects of success factors on the e-learning system success. The success factors like system factors and technology factors with the mediating effect of user-satisfaction and system use and e-learning system success. Information system success (ISS) theory has been used to support the framework. A number of reliable databases like Emerald, JSTOR, Science Direct, Tylor and Francis and Springer have been consulted to add the support of the literature. The keywords like system factor (Service quality, Information quality, System quality) technology factor, user-satisfaction, system use, and E-learning system success have been used to search the relevant studies. It has been studied that system factors and technology factors cause e-learning success and this relation is also mediated by user-satisfaction and system use. At the end, the limitations of the study are described, and future research descriptions are recommended.

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#### Introduction:-

The world has become a global village and accessing information becomes easier for everyone regardless of where he/she is. A lot of attention has been given to e-learning efforts and experiments across the world. Global learning, borderless world and liberalization of global world are the concepts led by rapid change in technology and globalization. Development of information technology has significant impact on human lives. Information technology has become important for every aspect of human life such as manufacturing, business, government and education (Rohayani.AH, Kurniabudi, Sharipuddin, 2015). In teaching and learning Information and communication technology (ICT) has been realised as a valuable assisting tool (Drier, 2001; Giannakos, 2014; Vajargah & Saadattlab, 2014).

The traditional method of learning is going through a fundamental change. The learning and teaching traditional concept has been changed (Marold, Larsen, & Moreno, 2000; Zhang & Nunamaker, 2003). Now a days teaching and learning through internet which is also known as electronic or e-learning has become a major trend. In developing online substitutions to traditional type of training system and education an extensive amount of money and time is spending by institutions and corporate sector. E-learning commonly means a system of education delivered through electronic means and is termed as online learning (Sanchez & Hueros, 2010; Trombley & Lee, 2002).

E-learning has become a trend in education sector and also a focus of many researchers. Many studies have been done on e-learning and several studies have made education and e-learning their subject, for example., exhibiting the adoption of e-learning systems (Abdullah & Ward, 2016), success (Aparicio, Bacao, & Oliveira, 2016; Wang, Wang, & Shee, 2007a) and satisfaction (Aggelidis & Chatzoglou, 2012), the stress in many studies is on the implementation success of e-learning. While the determining factors of success in e-learning needs to be studied in depth. (Aparicio, Bacao, & Oliveira, 2016). Moreover, to measure the success of e-learning there is a need to study the factors that effects the success.

This study added the technology factor in Delone and Mclean (2003) IS success model to better understand the factors that effects the success of electronic learning. As technology is an important factor in the electronic learning. The remaining paper is organised as follows: next section explains the literature review, after literature review hypothesis are discussed, on the basis of literature and hypothesis the proposed research framework is developed, after framework the next section is recommendation followed by conclusion.

### **Literature review**

DeLone and McLean were the first who introduced the model of success of information system in 1992 which is known as ISS model. The basis of ISS model is the theory of information influence presented by Mason (1978) which is a modification of mathematical theory of communication presented by Shannon and Weaver's (1949). System quality, Information quality, system use, user satisfaction, individual impact and organizational impact are the six constructs of the ISS model (DeLone and McLean 1992). In the first decade, the model has been critiqued and questioned by many researchers and also applied and confirmed by others and model is referenced 285 times in different journals and proceedings (Holsapple & LeePost 2006). The ISS model has become a foundation for researchers in the field of information system and the original model has been referenced 3164 times today. Many IS researchers criticized for extension and gave ideas for modification in the original model (Seddon 1997; Seddon & Kiew 1996). DeLone & McLean consider all the criticism and updated their model in 2003 to cope up with the internet era (DeLone & McLean 2003).

This study will use the Delone & Mclean model with the addition of technology factor to better understand the success factors of e-learning.

### **E-learning Success**

The success of e-learning has been studied from various viewpoints. The focus in some of studies was on the course attendance or on the use of a specific platform (Baker, Boggs, & Arabasz, 2003; Newman, 2003). The focus of other studies is on financial and technological characteristics (McGill, Klobas, & Renzi, 2014). The impact of past experience of students on e-learning system success and system use has been studied by many researchers (Gay & Dringus, 2012; Hachey, Wladis, & Conway, 2015; Parkes, Stein, & Reading, 2015). The impact of association in completion of course and social environment have been addressed in other studies (Artino, 2010; Rosé, Goldman, Sherer, & Resnick, 2015). Some other studies performed meta-analysis as their focus was on different types of strategies for e-learning (Aparicio, Bacao, & Oliveira, 2016; Belcadhi & Ghannouchi, 2015; Means, Toyama, Murphy, Bakia, & Jones, 2009; Means, Toyama, Murphy, & Baki, 2013).

There are several factors that accounts for e-learning success, for example, use and integration of technology by students and instructors and the availability of technology. Also, there are several challenges in the revolution of learning style which includes continuous development of technological skills of students and instructors and also changes in the cultural propescts. These characteristics need to be accomplished and executed effectively to achieve overall enhancement of learning experience of students and staff (Al-adwan & Smedley, 2012).

This study will focus on the success model developed by Delone & Mclean in 2003 with the addition of technology factor as it is an important factor in the success of e-learning.

### **System Factors**

The system factors are the considered as the important factors that affects the success of e-learning system. From DeLone & McLean (2003) information system success model, service quality, system quality and information quality are the system factors that are studied and explained below.

System quality is represented as the thinking of people about the system's performance. The measurement of system quality is the hardware (available for user) and software application (made for future use and needs) in the perspective of e-learning. While the users are unaware of the network required for an e-learning system (ELS). As internet access is required for network to network communication in using e-learning. Features of high quality ELS are: accessibility, usability, awareness of user expectations, and learning ease (Guimaraes, Armstrong & Jones, 2009; Halawi, McCarthy & Aronson, 2008).

The quality of support from IT support and IS department received by system users is termed as Service quality (Petter, DeLone & McLean, 2008; Rana, Dwivedi, Williams & Weerakkody, 2014; Paper, Nguyen, & Nguyen, 2016). Reliability, availability, assurance, empathy, responsiveness, efficiency etc are the examples. Service Quality was found as one of the most significant factor in the past studies that effects intention of user to use system and consequently affects user satisfaction (Lee & Yu, 2012; Qteishat, 2014; Gorla, Somers & Wong, 2010; Zaremohzzabieh & Samah, 2016). Better service quality significantly effects user satisfaction (Brown & Chin, 2004; Zhu, Wymer, & Chen, 2002; Chen, Jubilado, Capistrano & Yen, 2015). In relation to e-learning service quality can be postulated as the complete provision transported to the learners and users of e-learning system (Chiu, Chiu & Chang, 2007). The issues that are considered important for acceptance of e-learning are training, accessibility of equipment and providing support (Lee & Lee, 2008). Furthermore, support of teaching assistant, training of computer and flexibility of program is also included (Arbaugh & Duray, 2002; Teo, 2011).

Quality of information that is produced by the system is termed as Information quality. The reliability, precision, comparability, timeliness, accuracy, understandability, currency, conciseness, relevance, format, completeness, and meaningfulness are traditionally included features of Information quality (Swaid & Wigand, 2009). The most important part in an online learning website is content. Users acceptance of system can be affected by exact information and features (Lin & Lu, 2000). The online learning system success can be affected by Information quality.

The study conducted by Almarashdeh (2016) showed that all system factors (service quality, system quality, information quality) have significant association with user satisfaction. He proposed a comprehensive framework to measure the satisfaction of instructor in using Learning Management System (LMS). The findings of the study showed that instructor satisfaction is highly affected by perceived usefulness and service quality. In contrary, the instructor satisfaction will affect negatively the online course outcomes if it will not be taken into account in building LMS.

#### **On the basis of above literature following hypothesis has been developed**

**H1:-**System factor has a significant relation with user satisfaction.

**H2:-**System factor has a significant relation with system use.

#### **Technology**

Nowadays, information technology is considered as an important factor when using technology in any project, because it will save data and information for a long time and enhance the education process. Technology is the core enabler of E-Learning. Most higher education institutions still face challenges when implementing e-learning, especially in relation to the technological aspects (Hussein, Aditiawarman, & Mohamed, 2007; Qureshi, Ilyas, Yasmin, & Whitty, 2012; Tarus, Gichoya, & Muumbo, 2015; Mosa, Naz'ri bin Mahrin, & Ibrahim, 2016). Moreover, the effectiveness of Information Technology (IT) and the quality of technology should be considered in achieving e-learning implementation success (Malik, 2010).

Moreover, technology may affect the initiative of e-learning as well. This can be explained as the universities might have enough resources to adopt e-learning but if it lacks in skills or other resources that are important for the improvement it will lead to failure. Also, the results might be negative without the training. At the same time, other organization who might have skills and resources to implement e-learning, but the attitude of the staff is negative towards technology it will also lead to failure (Aydin & Tasci, 2005). This shows that attitude towards technology, skills and resource are all important for the e-learning implementation success.

The study conducted by (Hagos, Garfield, & Anteneh, 2016; Ahmad 2010) showed that technology has a significant relationship with user satisfaction and system use. This study has proposed the following framework on the basis of previous literature.

**On the basis of literature review following hypothesis is developed**

**H3:-**Technology has a significant relation with user satisfaction.

**H4:-**Technology factor has a significant relation with system use.

#### **User Satisfaction and System Use**

User satisfaction and system use are the main constructs of DeLone & Mclean success model the leads to overall success of the system. The e-learning system success depends on the intension of user for the usage of e-learning service. Additionally, satisfaction is a critical success factor to build an enduring relationship (Lee M., 2010). Satisfaction is described as “affect or feeling or emotion resulting from one’s evaluation of the situation”. The Satisfaction has both positive as well as negative effects in the shape of satisfaction and dissatisfaction respectively (Savickas, 2000). The study conducted by Yengin et al. (2011), emphasised on the satisfaction of instructor as being the vital element for the accomplishment of e-learning system’s success. On the basis of IS success model (DeLone & McLean, 2003), the researcher developed a model in which instructor’s success was taken as dependent variable to estimate the success of e-learning system.

System use is said to be an important factor in success of system (Chang and Cheung, 2001; DeLone and McLean, 1992; Lucas 1978; Van der Heijden, 2004). It has also been estimated as a “possible to use” and an “intend to use” construct (DeSanctis, 1982). DeLone and McLean (2003) suggest that a simple construct of time spent on system is insufficient to measure system use

**On the basis of above explained literature system use following hypothesis is developed.**

**H5:**

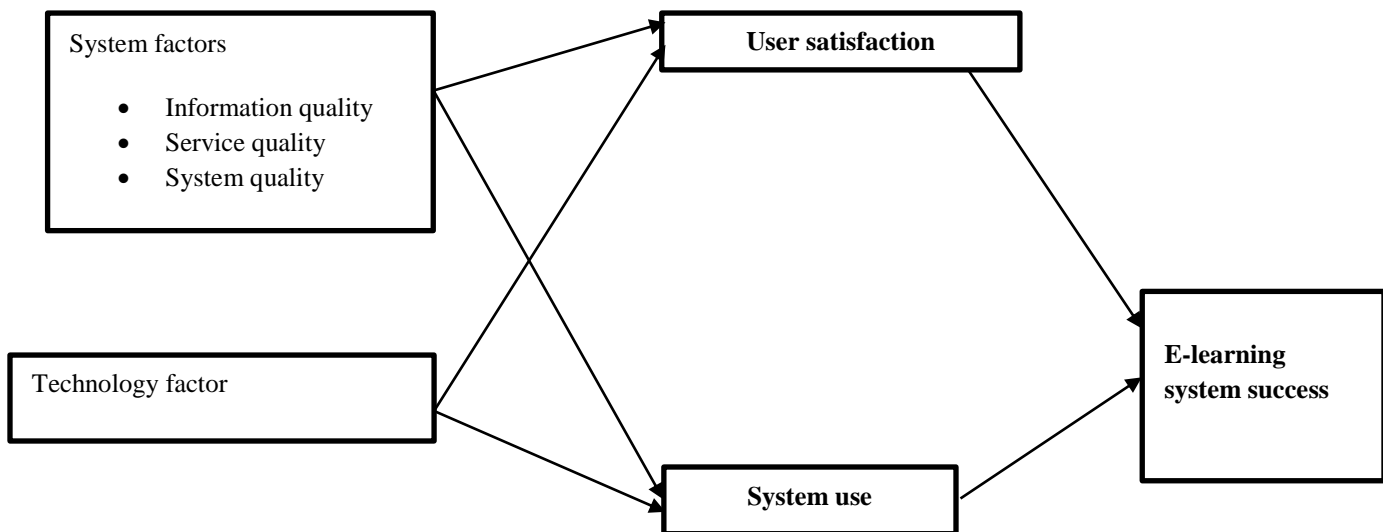
User Satisfaction has a significant relation with system success.

**H6:**

System use has a significant relation with system success.

#### **Proposed Framework**

The following framework is proposed on the basis of literature review and hypothesis.



Research Framework

### Recommendations

In Malaysia e-learning has been implemented but there is a need to measure the critical success factors. This research has tried to measure the factors affecting e-learning success in Malaysia. There is a need to test this framework empirically to better understand the factors in success of e-learning and also system factors should be tested as a composite variable to check the effect of system factor as a whole on system use and user satisfaction.

### Conclusion

In this digital era technology plays an imperative role. The rate of adoption of technology in education sector has been increased worldwide. Adoption of technology includes several factors that effects the success of it. These factors are social, human, technology, system factors. The role of instructor is also crucial in the success of e-learning. The e-learning success in any organization initiates by the acceptance of instructor, if the instructors are not willing to adopt this method of teaching there will be no success. And, the acceptance of instructors encourages learners to use e-learning.

Accordingly, the aim of this paper was to observe the critical success factors that might affects the instructors use of system and instructor satisfaction of e-learning and subsequently e-learning success. The factor described here in this paper is system factors that is comprised of system quality, information quality and service quality and technology factor that is comprised of quality of technology and effectiveness of IT.

This study predicted a thorough framework that can be used by researchers and experts to assess the acceptance of e-learning by instructors and ensure successful deployment of e-learning. Thus, upcoming research should develop or adopt reliable and valid measurements for scholars and experts to assess the impact of these factor on instructor's acceptance of e-learning system. This study only proposed a theoretical model, thus empirical researches are also required to validate the effects of these factors. Moreover, rigorous quantitative studies are required to validate the model and generalize it and also comprehensive treatment of the relations between the drawn factors is beyond the scope of this study which also provides an opportunity for further studies. Future studies should also add some human, social administrative factors in ISS model to better understand the success of e-learning.

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