

MODEL FOR TECHNOLOGICAL ASPECT OF E-LEARNING READINESS IN
HIGHER EDUCATION INSTITUTIONS

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MODEL FOR TECHNOLOGICAL ASPECT OF E-LEARNING READINESS IN
HIGHER EDUCATION INSTITUTIONS

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DEDICATION

*I dedicate this thesis to
my late father, may God have mercy on him
my beloved mother, my husband, my kids, my sister and
brothers
for their moral support and encouragement, and endless love
You give me hope, direction and light*

I am truly grateful to ALLAH for having them in my life

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ABSTRACT

E-learning has now been adopted by most universities across the world, where implementing e-learning in higher education has enabled a change in teaching and learning practices. One of the important aspects of e-learning readiness is the technological aspect, which plays an important role to ensure effective implementation of e-learning system. Although there are studies on e-learning readiness, there is still a lack of agreement about which factors shape the technological aspect of e-learning readiness. Therefore, this research investigated the technological aspect factors of e-learning readiness in higher educations, and formulated a technological aspect model based on the identified factors. This research involved three phases: First, it started with a systematic literature review to identify factors that influence technological aspect of e-learning readiness. Six technological factors emerged: hardware, software, connectivity, security, system flexibility, and technical skills and support. Second, Delphi technique was used to review the six technological factors, and to formulate the technological aspect model. The Delphi technique confirmed the 6 technological factors, and yielded 2 new factors namely cloud computing and data center. Third, a survey was conducted to evaluate the technological aspect model. A total of 374 questionnaires were collected from the academic staff of six Malaysian public universities. The data were analyzed using Structural Equation Modelling, and the results indicated that the eight technological factors, except cloud computing, have significant impact on the e-learning readiness in higher education institutions. In addition, the technological aspect model of this research highlights data center as an important technological factor for e-learning readiness, which is a new factor in e-learning readiness literature. In conclusion, this research has provided valuable insights into the relationship among the technological aspect factors. Besides, the technological aspect model is useful to assist university management teams to assess the readiness and ensure efficient implementation of their e-learning systems.

ABSTRAK

E-pembelajaran kini telah digunakan oleh kebanyakan universiti di seluruh dunia, dimana pelaksanaan e-pembelajaran dalam pendidikan tinggi telah membolehkan perubahan dalam amalan pengajaran dan pembelajaran. Salah satu aspek yang paling penting dalam kesediaan e-pembelajaran adalah aspek teknologi, yang memainkan peranan penting dalam melaksanakan sistem e-pembelajaran yang berkesan. Walaupun terdapat kajian terhadap kesediaan e-pembelajaran, masih terdapat kekurangan persetujuan tentang faktor-faktor yang membentuk aspek teknologi kesediaan e-pembelajaran. Oleh itu, kajian ini mengkaji faktor aspek teknologi kesediaan e-pembelajaran dalam pendidikan tinggi, dan membentuk model aspek teknologi berdasarkan faktor-faktor yang dikenal pasti. Kajian ini melibatkan tiga fasa: Pertama, ia bermula dengan semakan kajian lepas yang sistematik untuk mengenal pasti faktor-faktor yang mempengaruhi aspek teknologi kesediaan e-pembelajaran. Enam faktor teknologi telah dikenal pasti: perkakasan, perisian, kesambungan, keselamatan, fleksibiliti sistem, dan kemahiran teknikal dan sokongan. Kedua, teknik Delphi digunakan untuk menilai enam faktor teknologi, dan merumuskan model aspek teknologi. Teknik Delphi mengesahkan enam faktor teknologi, dan menghasilkan dua faktor baru iaitu pengkomputeran awan dan pusat data. Ketiga, tinjauan telah dijalankan untuk menilai model aspek teknologi. Sebanyak 374 soal selidik telah dikumpulkan dalam kalangan kakitangan akademik dari enam universiti awam Malaysia. Data dianalisis dengan menggunakan Model Persamaan Struktur, dan dapatan kajian menunjukkan bahawa lapan faktor teknologi, kecuali pengkomputeran awan, mempunyai kesan yang signifikan terhadap kesediaan e-pembelajaran di institusi pengajian tinggi. Di samping itu, model aspek teknologi kajian ini mendapati pusat data sebagai faktor teknologi penting untuk kesediaan e-pembelajaran, yang merupakan faktor baru dalam kesediaan e-pembelajaran. Kesimpulannya, penyelidikan ini telah memberi pandangan berharga berkaitan hubungan antara faktor-faktor aspek teknologi. Selain itu, model aspek teknologi adalah berguna untuk membantu pasukan pengurusan universiti untuk menilai kesediaan dan memastikan pelaksanaan sistem e-pembelajaran yang cekap.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Information and communication technology has a great global impact on both developed and developing nations, in individual ways. Consequently, the progress and prosperity of countries has been linked to the extent of the progress and achievements in this area. Due to this impact, most countries have begun to develop various institutions to keep pace with scientific and technological revolutions. Higher education institutions are some of the most important institutions, having a great impact on society, and consequently having greater responsibility towards entire education systems (Naresh and Reddy, 2015). Higher education institutions in both developed and developing nations have begun to respond to the technological revolution with required changes, creating new opportunities for improving the existing education systems and learning styles. This helps to develop and innovate new and effective teaching and learning methods. It also assists the emergence of many modern concepts within the field of education, including e-learning.

E-learning refers to the use of electronic media, educational technology and information and communication technology (ICT) such as internet, e-mail, and computers, within the educational process (Contreras and Hilles, 2015). E-learning has become an increasingly-significant element of the pedagogy approach adopted by higher education institutions (HEIs) (Kituyi and Tsubira, 2013). According to Tarus, Gichoya, and Muumbo (2015), e-learning is an increasingly-popular approach to teaching and learning in most worldwide institutions of higher learning. The main purpose of e-learning's adoption by higher education institutions is to increase the educational process's accessibility without involving time or place restrictions, while also improving the education's quality and content (Doculan, 2016; Olson et al., 2011).

1.2 Background of the Research Problem

The e-learning trend, which has had a stunning impact in developed countries, has now also made its mark in developing countries (Naresh and Reddy, 2015). A look at developed countries indicates that their living standards have significantly improved, reflecting economic, social and technological progress (Rhema and Miliszewska, 2010). These comparatively more-developed countries provide easy technological access to their citizens, so that they can adopt the latest technology innovations and capitalize on their benefits. Similarly, in this part of the world, e-learning seems to have become an increasingly-significant element of secondary and tertiary education (Kituyi and Tusubira, 2013). Greater numbers of students and teachers are adopting this technological advancement, in order to complete educational processes. In developed countries access to technology is not only easy, but also very cheap. It therefore provides a significant opportunity for both conducting and attending educational classes virtually, without the need to be physically present. Developed countries make use of this technology in all aspects of social functioning, including in enhancing learning, communication and entertainment in their daily lives (Chan and Lee, 2007).

On the contrary, the case for adopting e-learning in developing countries has still been placed at an initial stage (Albarrak, 2010). In developing countries, the adoption of e-learning still faces challenges and failures (Hussein et al., 2007; Qureshi et al., 2012; Tarus et al., 2015). Developing countries face challenges in e-learning, including a lack of infrastructure, trained instructors, a lack of financial support, existing government policies, and reduced student readiness (Naresh and Reddy, 2015). Developing countries have more challenges than developed ones, in regards to adopting e-learning in higher education institutions (Naresh and Reddy, 2015).

A review of literature shows that most failures and challenges related to e-learning adoption come from the perspective towards technology in developing countries (Kwofie and Henten, 2011; Al-Masaud and Gawad, 2014; Islam et al., 2015; Mulugeta and Buckley, 2015; Naresh and Reddy, 2015). Andersson and Grönlund (2009) conducted a study to review research focused on challenges to e-learning in

higher education, with a particular focus on developing countries. They also conducted a comprehensive literature review of e-learning challenges, implemented for the purpose of understanding how to implement e-learning in developing countries. The overall conclusion reached is that more papers focus on technology aspect, meaning that the technology aspect presents more of a challenge to e-learning in developing countries. According to Hills and Overton (2010), the technological aspect is one reason for e-learning failure, an example being the use of bespoke or experimental software, rather than tried or tested tools, which can result in failure. This result is a motivation to learn more about the technological aspects of e-learning.

The technological aspect is one important factor behind the success of an e-learning system (Albarrak, 2010; Alhomod and Shafi, 2013; Mehregan et al., 2011). The technological aspect of e-learning refers to the use of different types of technologies to facilitate, enhance and support teaching and learning. These technology types include computers, the internet, mobile phones, audio/video tools, CDs, DVDs, video conferences, emails, and discussion forums (Nyandara, 2012).

The primary reason for the failure to adopt e-learning in many organizations is the lack of an assessment of organizational readiness for e-learning (Alshaher, 2013). Hanafizadeh and Ravasan (2011) state that, without proper readiness assessment, e-learning projects will probably face challenges during implementation. E-learning readiness is “the mental or physical preparedness of an individual for some e-learning experience or action” (Borotis and Poulymenakou, 2004). E-learning readiness has also been defined as “factors that must be accomplished before e-learning implementation can be regarded as being successful” (Odunaike et al., 2013). The commonly-used approach to determining e-learning ‘readiness’ is to assess certain organizational and individual factors that should be considered if organizations are likely to be successful in introducing an e-learning strategy (Chapnick, 2000; Redmon and Salopek, 2000; Hall, 2001; Rosenberg, 2001). According to Schreurs and Al-Huneidi (2012), to successfully undertake e-learning implementation, to realize its benefits and to overcome related barriers, organizations must be ready for e-learning by measuring its readiness and improving its weak points. Adopting e-learning technology without measuring e-learning’s readiness leads to failure in implementing

e-learning (Rohayani, 2015). Therefore, most higher education institutions in developing countries still face challenges in terms of implementing e-learning, especially in relation to technological aspects, due to a lack of assessment of technological aspect readiness. Here lack of assessment creates challenges and jeopardizes e-learning's successful implementation (Alshaher, 2013).

The technological aspect of e-learning readiness refers to institutions providing necessary ICT infrastructure for e-learning in terms of technical help, e-learning content delivery and broadband facilities, and also a Learning Management System (LMS) and the availability of computers and Internet (Krishnan and Hussin, 2017). The successful implementation of e-learning relies on a high level of ICT infrastructure readiness (Ouma et al., 2013). Albarrak (2010) has pointed out that researchers have made several attempts to investigate the influence of readiness factors on the outcomes of e-learning. In light of these studies, it has been found that technological readiness is one key factor that shapes and affects the outcomes of e-learning within an educational setting. For example, one of the relevant technological aspects is internet access, with low internet speeds and other problems faced while using e-learning systems potentially resulting in dissatisfaction, and causing students to drop out from e-learning courses (Keramati et al., 2011). Therefore it is necessary to assess the issue of technological readiness for e-learning before implementing an e-learning system, so that its benefits can be realized, and so that challenges related to e-learning implementation can be reduced (Alshaher, 2013). Bhuasiri et al. (2012) highlighted technological aspects as being an important factor in a successful e-learning system. Therefore, the readiness of technological aspects need to be thoroughly explored in order to analyse overall e-learning readiness.

As a developing country, Malaysia has a vision to become a fully developed nation in the near future (Grapragasem et al., 2014). The government, along with policy-makers, have developed a similar vision for the higher education sector. This aspiration for higher education has been expressed in the National Higher Education Strategic Plan (NHESP). Accordingly, the higher education policy has been consistent and in line with Vision 2020 (Ministry of Higher Education, 2011). Embi (2011) indicates that NHESP is a document which interprets the direction of national higher

education for developing human capital for the future. To ensure NHESP's implementation in accordance with set phases, the Ministry of Higher Education (MOHE) has developed 21 Critical Agenda Projects (CAPs). E-learning is one of the CAPs, and a National Key Result Area (NKRA) of MOHE (Khodabandelou, 2014). In 2017 the Malaysian government conceived Transformation National 2050 (TN50), within the lineage of the New Economic Policy. TN50 is a continuation of Vision 2020 within Malaysia's development journey (Kaur, 2017). TN50 is a national development initiative spanning the years from 2020 to 2050. This initiative will be driven by clear 30-year goals and targets, which are being developed through an inclusive and consultative process (Ministry of Foreign Affairs of Malaysia, 2017). The general goal for TN50 is for Malaysia to become a top-20 country by the year 2050.

Since e-Learning is one of the Critical Agenda Projects (CAPs) and a National Key Result Area (NKRA) of the Malaysian Ministry of Higher Education (MOHE), Malaysia's private universities have begun to include objectives designed to promote e-learning methodologies and multimedia skills. The introduction of e-learning in private universities is important, because this sector depends on e-learning much more than the public counterpart, and because these universities are compelled by their charters to provide distance education and multimedia teaching options (Puteh and Hussin, 2007). Therefore, Malaysia's higher education institutions need to assess the technological aspect of e-learning readiness, whereby the readiness of the technological aspect is a critical factor for the success of e-learning initiatives. The assessment of the technological aspect will help the administrative leaders of higher education institutions to determine the level of readiness and work required to improve the weaknesses of technological aspect points, so that they can be used to better apply e-learning and to keep up with the government-led initiatives in achieving e-learning across all Malaysian higher education.

Despite there being several studies assessing e-learning readiness, such as those of Darab and Montazer (2011), Akaslan and Law (2011), Keramati et al. (2011), Omoda-Onyait and Lubega (2011), Alshaher (2013), and Engholm and McLean (2001), there is a lack of studies used to identify factors which influence the technological aspect of e-learning readiness, especially in the context of Malaysian

higher education. Therefore, this research seeks to formulate a technological aspect model, which includes technological factors used to assess e-learning readiness.

1.3 Problem Statement

Most e-learning failures and challenges come from the approaches' technological aspect, the reason for this being the lack of assessment technological aspect readiness in e-learning. The lack of readiness regarding the technological aspect creates challenges and jeopardizes the successful implementation of e-learning. In order to have successful e-learning, and to overcome technological aspect challenges, higher education institutions should be ready by assess the technological aspect of e-learning readiness. Therefore, this research seeks to formulate a model which highlights the factors of the technological aspect which should be considered when assessing e-learning readiness. This model will help higher education institutions by providing important technological factors that should be considered by the institutions seeking to adopt e-learning projects. Furthermore, this model can be used by designers and developers as a guideline for identifying necessary technological aspect requirements for e-learning adoption.

1.4 Research Aims

In accordance with the study conducted by Alhomod and Shafi (2013) prior to implementing an e-learning system, it is important to identify factors that can influence the technological aspects of effective e-learning. Therefore, this research seeks to investigate and identify the technological aspect factors of e-learning readiness in higher education institutions, and to formulate a technological aspect model based on the identified technological factors.

1.5 Research Questions

The main questions this research seeks to answer include:

1. What factors influence the technological aspect of e-learning readiness?
2. How can a model be formulated for the technological aspect of e-learning readiness?
3. How can the formulated model for technological aspect of e-learning readiness be evaluated?

1.6 Research Objectives

For this research, the following objectives have been identified:

1. To investigate factors influencing the technological aspect of e-learning readiness.
2. To formulate a model for the technological aspect of e-learning readiness.
3. To evaluate the technological aspect model of e-learning readiness.

1.7 Research Scope

This research's scope has been limited to the following areas:

A systematic literature review (SLR) was performed for identifying the factors that shape the technological aspect of e-learning readiness. The reason behind using

the SLR technique was its thorough and fair process, as it is comprised of predefined search strategies (Kitchenham, 2004; Kitchenham, et al., 2009). In this research the SLR approach was concentrated on searching scientific databases for journals articles, workshop papers, conference papers, books chapters and published theses that addressed e-learning readiness.

The Delphi technique was used to review the list of technological factors identified from SLR, for the purposes of their naming, their description, the relationships between factors, and formulating a technological aspect model. The reason behind using the Delphi technique is that it is an effective study method used to formulate group judgments from a group of experts, by means of a series of questionnaires interspersed with controlled opinion feedback (Hsu and Sanford, 2007). The size of the Delphi Panel in this research was 11 experts, with the selected experts specializing in the field of e-learning, having knowledge of the technology aspect. Three rounds of the Delphi technique (R1-R3) were used to collect data through questionnaires, whereby questionnaires were sent to eleven experts via email.

For conducting surveys, quantitative questionnaires as an instrument were distributed to faculty members in six Malaysian public universities, including Universiti Malaya (UM), Universiti Islam Antarabangsa Malaysia (UIAM), Universiti Kebangsaan Malaysia (UKM), Universiti Teknologi MARA (UiTM), Universiti Putra Malaysia (UPM), Universiti Pertahanan Nasional Malaysia (UPNM), and Universiti Pendidikan Sultan Idris (UPSI). In the context of this research, Malaysian public universities were chosen as Malaysia aims to become a developed country in the year 2050 (Grapragasem et al., 2014). E-learning is one of the higher education policies aimed to be achieved in the goal of TN50. In relation to the ambitious TN50 project, Malaysia's private universities have begun to include objectives designed to promote e-learning methodologies and multimedia skills (Puteh and Hussin, 2007). This research on e-learning readiness is therefore timely and will shed light on e-learning readiness in Malaysia. For that reason, the focus on Malaysia and its vision to reach the implantation of e-learning in the year 2050 is timely. The six public universities were selected because they implemented e-learning. Therefore, it was possible for this research to benefit from their experience in applying e-learning, in order to evaluate

the formulated technological aspect model of e-learning readiness. This research also considered using the academic staff population as its respondents, since it is crucial to elicit opinions from people who are highly efficient and have experience in the relevant domain (Al-Hilawi, 2006). The reason behind selecting the questionnaire as a survey conduction instrument was that there was a need to have a large amount of responses in reduced time, and at a relatively low cost (Kasunic, 2005). The data was analyzed through two software programs, including the Statistical Package for the Social Sciences (SPSS v23) and Structural Equation Modelling (SEM) using Amos. The sample size used for this research was 374 faculty members, whose e-learning experience included teaching, establishing, maintaining, and designing e-learning system applications.

1.8 Research Contribution and Significance

This research has sought to add to the body of knowledge related to the field of e-learning, by identifying the technological aspect factors of e-learning readiness. Advances to the existing body of knowledge have been made possible by performing SLR with the greater availability of published literature, and through detailed search processes. By identifying the technological factors of e-learning readiness, the researchers have managed to overcome the gap of the lack of existing studies reporting on factors that influence the technological aspect of e-learning readiness.

This research has formulated the technological aspect model of e-learning readiness. The model highlights the technological aspect factors that should be consider for assessing e-learning readiness, helping university management and stakeholders to assess and analyze their preparedness through the factors included in the model, before initiating e-learning projects. The assessment of technological aspects will provide guidance for administrative leadership in higher education institutions, in terms of developing policies and plans. It will also help them identify some weak points which can be improved through taking some improvement actions, and thereby avoiding potential risks in implementing e-learning stages (Alshaher, 2013). The model can also guide higher education institutions in identifying the

requirements of technological aspects for adopting e-learning. In addition, the model can be used as a reference guideline for designers and developers in identifying necessary technological requirements for implementing e-learning.

This research provides an empirical model regarding the technological aspect of e-learning readiness. There is a scarcity of studies focused on the formulating and empirical testing of models concerning the technological aspect of e-learning readiness. Therefore, a model of the technological aspect has been formulated and tested through this research. The model has added new knowledge for understanding significant factors of the technological aspect of e-learning readiness. The most important factor for the technological aspect has been considered by taking into account the university faculty members' viewpoint, namely that related to software, hardware, connectivity, security, system flexibility, technical skills and support, and data centers. The relationships between the technological aspect factors were described through the research model. Therefore, this research contributes to the body of knowledge related to the e-learning field, and to the limited existing literature related to the Malaysian context.

A mixed-method approach has been employed to achieve the defined research objectives. Most previous studies have used either a qualitative or quantitative approach. The advantages of applying a mixed-method approach is that it allows researchers to be more confident in their results' reliability and validity (Jick, 1979). Through this research the qualitative approach has been applied by means of the Systematic Literature Review (SLR) and the Delphi technique. The conducted SLR provides broad and deep information about factors which affect the technological aspect of e-learning readiness. The Delphi technique has been implemented to formulate a model for the technological aspect of e-learning readiness. Meanwhile the quantitative approach has applied using questionnaire surveys, to evaluate the research model. The results of the carried-out survey have detailed the technological aspect model of e-learning readiness, describing the independent technological factors that affect e-learning readiness. The mixed methods strategy adds richness to the research, along with the empirical findings specifically relevant to Malaysian higher education.

1.9 Definition of Terms

E-learning: Liaw et al. (2007) defined e-learning as being the convergence of technology and learning, and as the use of network technologies to facilitate learning anytime, anywhere. For this research's purpose, e-learning has been defined as being the use of computer network technology through the internet, to deliver information and instruction to learners.

E-learning Readiness: Readiness, in regards to this research, can be defined as "how ready the organization is on several aspects to implement e-learning" (Schreurs et al., 2008). E-learning readiness has been defined as being related to the completeness of an e-learning programme or education system, while also being defined as a prerequisite of any e-learning programme (Vilkonis, Bakanovienė and Turskienė, 2013). For the purpose of this research, readiness is defined as being the mental or physical preparedness of higher education institutions for the e-learning experience.

Technological Aspect of E-learning: This refers to the use of different types of technologies to facilitate, enhance and support teaching and learning. These technologies include computers, the internet, mobile phones, audio/video tools, CDs, DVDs, video conferences, emails, and discussion forums (Nyandara, 2012).

Higher Education: In the World Declaration on Higher Education, as adopted by the World Conference on Higher Education in 1998, higher education has been defined as being: "all types of studies, training or training for research at the post-secondary level, provided by universities or other educational establishments which are approved as institutions of higher education by competent state authorities" (World Conference on Higher Education, 1998).

1.10 Outline of the Thesis

In order to successfully achieve this research's main aims and objectives, a predetermined outline and layout for the research has been recognized as necessary. In the case of this research, the outline includes seven chapters which can be summarized as follows:

Chapter 1 introduces the research topic discusses the related issues and details the relevant background, while also providing the key objectives that the researcher intends to achieve through the research's successful completion. Additionally, this chapter of the research identifies the problem statement that the researcher intends to answer by completing this research. In addition, the chapter also details the motivation, scope, significance and rationale of conducting this research. Lastly this chapter briefly outlines the format the researcher followed in the pursuing the achievement of this research's objectives.

Chapter 2 presents a review of relevant literature. In this chapter, the previous literature available on the topic has been analyzed and assessed, to further develop an understanding of the research topic. This chapter discusses each topic element in detail, through both generalized and specific points of view. Additionally, in this chapter identifies gaps in studies conducted by previous researchers, information which is useful for conducting this research.

Chapter 3 explains the research design and methodology used in this research. In this chapter, the methodologies adopted by the researcher for achieving the research objectives are identified, including Systematic Literature Review (SLR), the Delphi technique, and the survey method. In addition, the techniques adopted by the researcher to generate data and analyze the collected data have also been presented.

Chapter 4 presents the SLR's results and a discussion of them, focusing on the technological factors of e-learning readiness. Selected papers were analysed in accordance with the designed selection processes, and the findings of SLR research questions were presented.

Chapter 5 provides the results of the Delphi technique, in order to review the identified technological factors extracted from SLR. The chapter also discusses finds from the three rounds of the Delphi technique, and then formulates the technological aspect model of e-learning readiness.

Chapter 6 describes the survey conducted to evaluate the formulated model of the technological aspect of e-learning readiness. This chapter describes the survey's structure, in terms of its objective, target audience, population and sampling, and its questionnaire design, testing and distribution. The survey's analysis and results were also described in this chapter.

Chapter 7 concludes the research. The researcher firstly shows that each research objectives has been achieved, and that the results have been thoroughly discussed. After this the major contributions have been stated, and finally the conclusions, recommendations and suggestions for future works are presented.

1.11 Summary

This chapter introduces the research context and provides a brief outline of the research's background. The specific problem statement is also described, with the research aims being defined. Three research questions were defined for this research, and three objectives have been determined as a means for answering the research questions. The scope of this research has been explained, followed by an explanation of its significance. Key definitions of terms related to the research have also been presented. Finally, the thesis's structure has been explained through this chapter.

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2. **Al-araibi, A. A. M.**, Mahrin, M. N. R. B., & Yusoff, R. C. M. (2016). A systematic Literature Review of Technological Factors for E-learning Readiness in Higher Education. *Journal of Theoretical & Applied Information Technology*, 93(2), 500-521. **(Q3, Indexed by SCOPUS)**
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4. **Al-araibi, A. A. M.**, Mahrin, M. N. R. B., & Yusoff, R. C. M. (2016). A model for Technological Aspect of E-learning Readiness in Higher Education. *Education and Information Technologies*, 24 (2), 1–37. <https://doi.org/10.1007/s10639-018-9837-9>. **(Q2, Indexed by ISI and SCOPUS)**
5. **Al-araibi, A. A. M.**, Mahrin, M. N. R. B., & Yusoff, R. C. M. (2018). Assessing Technological Aspect of Higher Institutions E-learning Readiness Using Delphi Technique. (Under Progress)