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Student Readiness Towards E-Learning Adoption in Higher Education: A Conceptual Model Based on Extended Technology Acceptance Model

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Abstract: *This paper main aims are to establish a conceptual model to assess student readiness and acceptance for e-learning. The concept was the extension of the technology acceptance model (TAM). Specifically, the proposed model expands the Technology Adoption Model (TAM) to include the e-learning factor and the readiness factor as external variable. In addition, the participant demographic profile — namely age, gender, and CGPA — is proposed to be directly influence of these constructs on behavioral intent and the use of technology. A detailed understanding of this model would provide useful insights into the variables that affect the adoption or resistance of the web-based learning system by intended users and provide opportunities for future studies to understand the acceptance of technology. Further, recognizing these factors is helpful for instructors to plan meaningful instructional activities to facilitate the development of student awareness and make learning more efficient and attractive.*

Keywords: *technology acceptance model, e-learning, student readiness, information technology, student acceptance.*

1. Introduction

The world experienced an outbreak of an entirely distinctive coronavirus in the 21st century at the end of 2019 in Wuhan, killing and suffering millions of people worldwide. (Shahzad, Hassan, Aremu, Hussain, & Lodhi, 2020). The virus was nominated as COVID-19 novel coronavirus by the Chinese scientists (Shereen, Khan, Kazmi, Bashir, & Siddique, 2020). In addition, the epidemic altered operational conditions around the world within a month. Since the pandemic COVID-19 struck globally, major affects the whole world in terms of economy, education and even our social life. Almost 120 countries have stopped face-to-face learning causing approximately a billion students' education worldwide is effected with COVID-19. The spread of the COVID-19 pandemic has opened up new pages and challenges for educators in Malaysia. Universiti Putra Malaysia (UPM) Deputy Vice Chancellor (Academic and International), Prof Dr M Iqbal Saripan, said from a positive point of view, COVID-19 is an agent to accelerate and expand the implementation of PdP online either at public universities (UA) or private higher learning institutions (IPTS). The closure of education institutions and schools is not an excuse to hinder the Teaching and Learning (PdP) process. To ensure that students do not drop out of learning during the Movement Control Order (PKP) period, educators need to go through the new habits 'the new normal' in the Teaching and Learning (PdP) process. This sudden change in the education system from two-way communication between educators and students in conventional learning into e-learning system totally may lead to other circumstances. Even our education system is on e-learning implementation, the development of e-learning in Malaysia is delayed compared to western countries and Singapore. The readiness of the teachers and students in accepting e-learning system are still under stage. Not all students have the online benefit due to two main constraints, namely lack of internet access, weak or unstable and the ability of parents to provide gadgets such as personal computers and tablets. Although the National Statistics Department in 2019 shows that

90.1 percent of households have internet access, but the issue of unstable internet is very critical, especially in rural areas. In 2018, the internet distribution gap between urban and rural areas is 70:30. This distribution gap affects the academic achievement gap of urban and rural students adding to the limitation factors. The main focus of this paper is therefore to propose a conceptual approach to assess e-learning that use the Technology Acceptance Model (TAM) and to recognise the most frequent external factors. In addition, the understanding of these variables is expected to assist decision-makers in recognizing the strengths and shortcomings of our e-learning infrastructure and help students to reach higher levels of acceptance of e learning. TAM is one of the most commonly used methods to analyze the adoption of emerging technology, as the information system community finds it to be a parsimonious and powerful theory. Many researchers point out that the main weakness of TAM is its inability to explain the external variables that rely largely on the technology, users, and field of application. By including the readiness factor and e-learning factor that affects the PU and PEU of the student and their BIM adoption status, this research expanded TAM to enhance the method.

2. Literature Review

2.1 Definition of E-Learning

E-learning make reference to the use of ICT to facilitate access to online learning / teaching resources. (Arkorful & Abaidoo, 2015). A learning concept which integrates information technology in the teaching and learning system to increase students' interest in learning. This concept of teaching and learning is important for educational institutions to further expand the teaching and learning methodology. Generally, e-learning is any teaching and learning that uses electronic networks to deliver content, interaction or facilitation. After the Covid 19 pandemic outbreak, e-learning has become necessary in higher education institutions and is being implemented worldwide in educational establishments. E-learning is also protected by a wider span of technology-based learning through blogs, learning portals, video conferencing, Twitter, smartphone apps, and thousands of free websites for blended learning resources (Islam, Beer, & Slack, 2015). Readiness for e-learning allows students to create a comprehensive learning strategy in using e-learning tools to improve their knowledge while ensuring the successful implementation of IT skills among them. Although operational definitions and assessment criteria for readiness are varied, most factors of E-learning readiness measure the following dimensions: the learner, the management, the personnel, the culture, the provision of relevant content, as well as technical, financial, and environmental resources. The e-learning supporting factors initiatives such as e-learning vision in institutions, development of technology planning and education policy related to e-learning, facilities to provide technological support to academics and students and also education development opportunities have major effects on the learning outcomes. This combination will enhance the students' experience of e-learning and enable the institution to realize the vision of the importance of e-learning (Alexander, 2001).

2.2 E-learning in Higher Education

Based on the latest developments in e-Learning at the higher education level, especially Malaysia Education Development Plan 2015-2025 (Higher Education) which has 10 surges including Global Online Learning (GOL), *Dasar e-Pembelajaran Negara* (DePAN 2.0) (Kementerian Pendidikan Tinggi, 2015) are being implemented on Phase 2 (2016-2020). E-learning implementation in Malaysian can be identified to five trends as following: E-learning policy, E-learning governance, learning management system (LMS), E-learning training and E-learning integration into teaching and learning (Embi, 2011). Higher education institutions are increasingly improvised in order to address the demands

of the growth of the education sector, in particular those competing in the Industrial Revolution 4.0, including the provision of numerous new education modules that meet the needs of the market. Most higher education institutions deliver online courses on and off campuses for their students. The government is providing a lot of money for higher education in Malaysia. Massive open Online Courses (MOOCs) are used by Malaysian universities , colleges and polytechnics on the base on news reports.(Shahzad et al., 2020). On the 2016-2023 forecast period, the growth of the online education market is estimated to be 16.4 percent annually. Hence, university teaching and learning models will develop in 10 to 15 years to adapt with the massive growth of the internet.

2.3 Technology Acceptance Model

Technology Acceptance Model (TAM) used by researcher to study the acceptance and readiness of technology. Figure 1 demonstrates the technology acceptance model (TAM) frame-work.

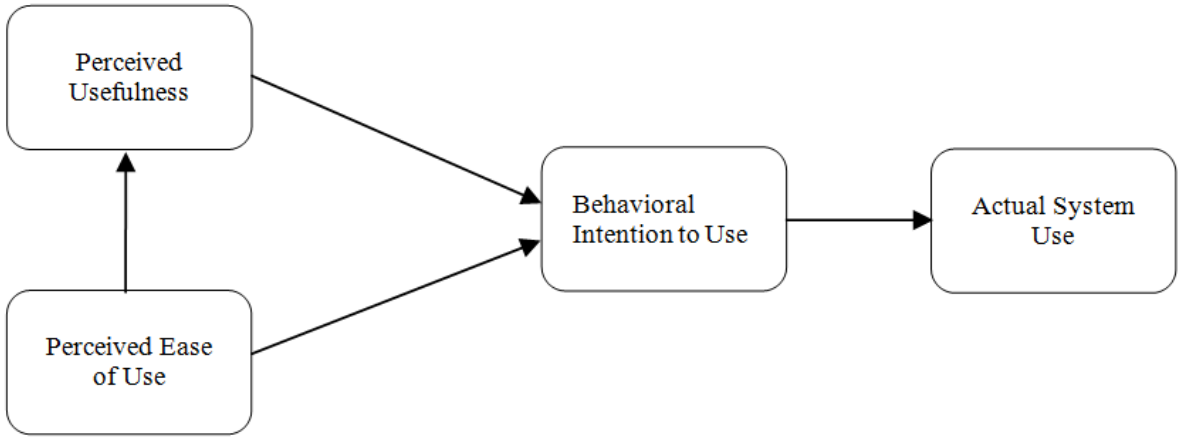

Fig. 1. Technology Acceptance Model (Davis, 1989)

The success of the Technology Acceptance Model (TAM) is evident from researchers' systematic use of it to learn about the adoption of technology and the use of information systems (Straub, Keil, & Brenner, 1997). As a common choice among academics, Davis, (1989) suggested the Technology Acceptance Model (TAM) to analyze the adoption of any new technology mainly due to its robustness and parsimonious nature. Several researchers who researched students' e-learning adoption have used TAM as the basis of their study (Iqbal & Bhatti, 2016). The TAM suggests that the belief that it is easy to use (perceived ease of use-PEU) and its adoption will result in improved performance (perceived usefulness-PU) is positively affected by the attitude towards using new technology. PU is "the degree to which an individual feel that using a particular technology will boost his or her job efficiency".

One of the basic precedent considerations is Perceived Usefulness (PU) for the usage and application of technology. PU refers to the degree of confidence in a programmed by people, which can improve the performance of the work (Venkatesh & Davis, 2000). Perceive Ease of Use (PEU) is characterized as the degree to which individuals believe that using a system is effortless. The main determinant of the decision to use the method was the PEU. There was a positive relationship between the perceived ease of use and the use of the device, emphasized in various contexts and technology implementations (Kripanont, 2007).

3. The Conceptual Model

This paper will describe a number of factors that could affect the use and implementation of e-learning systems in various domains. We explore the development of the proposed conceptual model for future study by describing in greater detail the various factors. The proposed model seeks to achieve a full understanding of the context under investigation that needs some sacrifice in the degree of rationality (Taylor & Todd, 1995b). In order to verify if the theoretical model is accurate or not, the creation of the proposed model allows potential researchers to hypothesise and evaluate the relationships between the established constructs (Sekaran & Bougie, 2011). The most suitable solution, however, was to choose the specific constructs related to the context of e-learning, building on the fact that previous models related to the acceptance and implementation of IT had some limitations.

The proposed research model would, in particular, incorporate 2 types of variables. The first section contains the main determinants (independent variables) that may influence behavioural intention (BI) and attitude towards use (ATT) of the framework for e-learning. Demographic profiles, e-learning factor, preparation factor, Perceived Ease of Use (PEU), Perceived Usefulness (PU), are these constructs. There are two dependent variables in the second category, which are BI and ATT. BI is anticipated to affect the e-learning system's ATT in this paper. The proposed conceptual model is shown in Figure 2 and a detailed description of each category is given in the following parts of this paper.

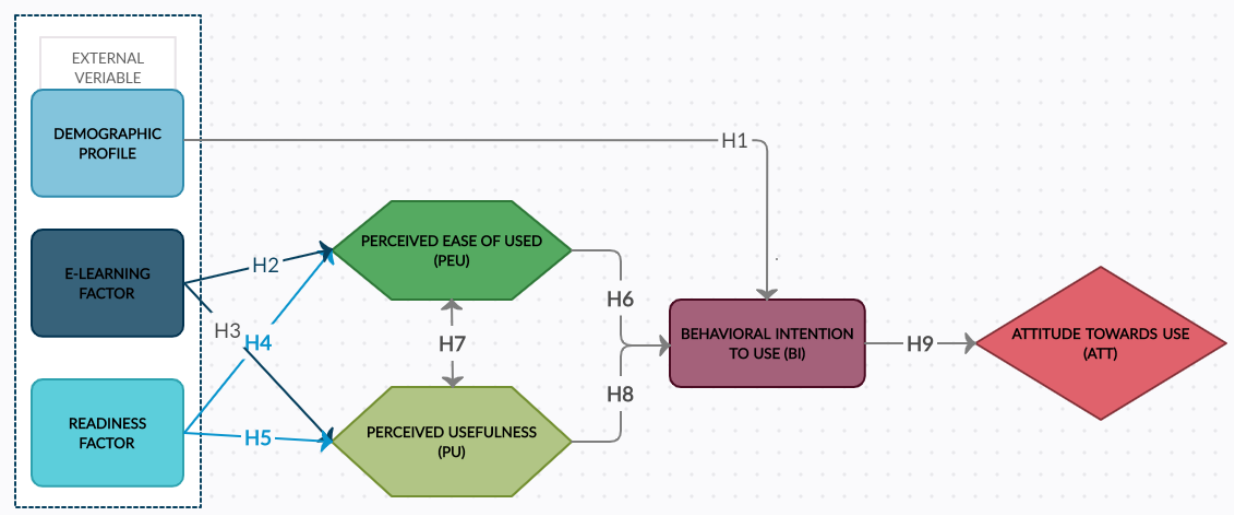

Fig. 2. Proposed Conceptual Model

3.1 Demographic Profile

For this study, three (3) important demographic scale items were selected. The item of the questionnaire is age, gender, and CGPA. Research has shown that age is a significant demographic variable with a direct and moderating influence on technology's behavioural intention, adoption and acceptance (Venkatesh, Morris, Davis, & Davis, 2003). Venkatesh, (2003) stated that, within UTAUT model, age was an significant moderator that have found that BI was greater for younger workers in an organisational. Gender is characterised in both social institutions and social practises as a hierarchical division between women and men (Jackson & Scott, 2001). In gender schema theory (Bem, 1981) and other technology acceptance models (e.g., TAM 2 and TPB), the consideration of gender in behaviour models was introduced. Previous research has shown that in decision-making processes, men and

women vary and typically use different socially developed cognitive structures (Venkatesh, Morris, & Ackerman, 2000). Gender was found to affect the relationship between performance expectation (similar to PU) and BI by Venkatesh et al. (2003), with the relationship substantially greater for men compared to women. In previous research, the level of education has been linked to knowledge and skills that in turn influence the behavioural intention (BI) to adopt and use emerging technologies (ROGERS, 2003). Like other individual variables, educational level or CGPA has been studied as a background (Agarwal & Prasad, 1999) as a moderator that influences the relationship between main determinants and behavioural intention (Burton-Jones & Hubona, 2006). Then, the researcher hypothesised:

H1a: Age have a direct positive significance on the Behavioural intention (BI) to use e-learning System.

H1b: Gender have a direct positive significance on the Behavioural intention (BI) to use e-learning System.

H1c: Student CGPA will positively affecting the Behavioural intention (BI) to use e-learning System.

3.2 E-learning Factor

E-learning is still seen as a new , innovative form of learning that offers a new alternative as well as a new way of solving problems for an institution (Król, 2016). While historically carried out in a classroom-based or instructor-led environment, more and more institutions are now implementing technology to provide education in a new environment. E-learning factor is an important variable to determine technology acceptance among users.

There are six factors influencing the efficacy of e-learning, according to the Ozkan & Koseler, (2009) model, namely system quality, service quality, content quality, learner's perspective, attitudes of in structure, and supportive issues. Hošková-Mayerová & Rosická, (2015) however proposed framework without including factors such as computer literacy and teaching method, in which also have significant effects. Some scholars, such as Islas et al., (2007), have concentrated on the technical components of e-learning systems. In the meantime, Liaw, Huang, & Chen, (2007) only emphasized the associated human element considering teacher and student satisfaction. In addition, e-learning is a complex learning mechanism that combines the use of ICT, the perceptions of teachers and the experiences of students. This conceptual model will study both human and technical influences, including the context of the learner, the teacher, and information technology. The Figure 3 shows E-learning factor.

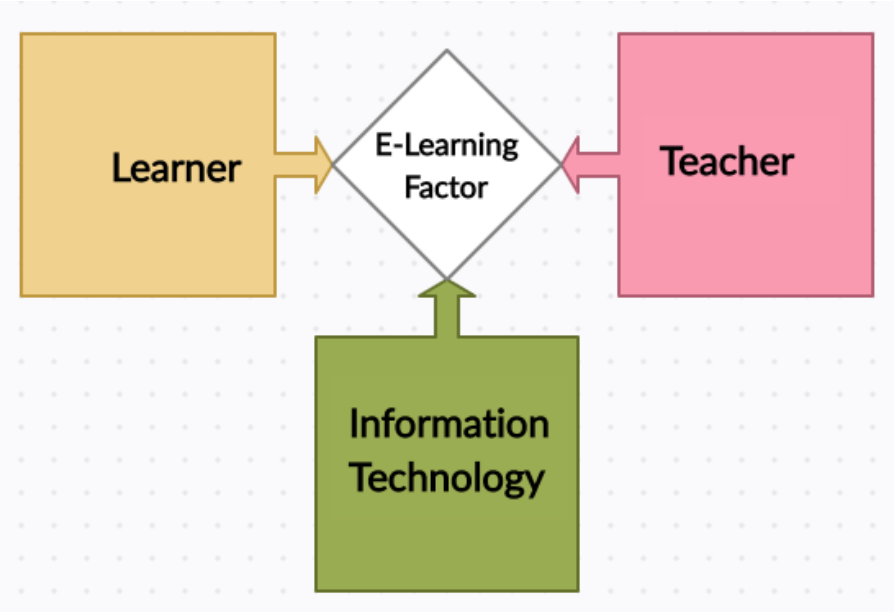

Fig. 3. E-learning Factor

a. Learner

The most significant participant in e-learning is a student (Aydin & Tasci, 2005). Since e-learning is a student-centered environment, it can lead to better e-learning outcomes for highly motivated and self-confident students (Baeten, Kyndt, Struyven, & Dochy, 2010). The attitudes of learners towards technology have a major influence on e-learning performance (Webster & Hackley, 1997). Passerini & Granger, (2000) emphasize that it is first important to recognize learner characteristics, such as attitudes , motivation, confidence, and trust. Ozkan and Koseler (2009) examined the attitudes of learners through the dimensions of self-efficiency, friendly experience, contact with other students and lecturers, and study habits of learners. The attitudes of the learner could have a major influence on e-learning, in which the learning system is self-explored, self-paced, and self-monitored. An e-learning application may be rich in the quality of its method, quality of service, and content, but it may decrease the effectiveness of e-learning if the learners' attitude is not right.

b. Teacher

The teacher's responsibility is crucial for all kinds of education to be effective and successful (Piccoli, Ahmad, & Ives, 2001). Particularly in distance learning, the philosophy and usefulness of e-learning by teachers plays an important role (Zhao, McConnell, & Jiang, 2009) and their positive attitude towards using this method as a teaching-assisted tool is crucial for the success of E-Learning (Liaw et al., 2007). Four key characteristics of teachers are used in this study, based on previous research, to evaluate this aspect, including: motivation, attitude, training and teaching style.

c. Information Technology

Information technology was described as the most significant factor of all success factors in an e-learning system on the basis of previous research (Parsazadeh, Megat, Zainuddin, Ali, & Hematian, 2013). The driver of the revolution in e-learning is IT (Selim, 2007). The role of IT in this form of education is significant and it is necessary to develop appropriate IT skills for the success of e-learning. Within the educational process , information technology has reshaped the process of acquisition,

communication and distribution of knowledge (Darab & Montazer, 2011). In terms of time, location, and space, this allows both the instructor and the student to be separated. The effective use of IT in the delivery of course material is therefore important (Lim, Lee, & Nam, 2007). Therefore, the following hypothesis suggested:

H2: E-learning factor have a direct positive significance to Perceived Ease of Use (PEU).

H3: E-learning factor have a direct positive significance to Perceived Usefulness (PU).

3.3 Readiness Factor

In E-Learning outcomes, several researchers have examined the function of readiness factors (Zhao et al., 2009). It has been proven by prior studies that. Technical readiness is one of the most significant factors affecting the results of e-learning (Brush et al., 2003) and matching the correct technology with the correct learning objective is critical (Collins, 2010). In this proposed model, based on literature, readiness factors are classified into three categories, which are technical, organizational and social factors. Figure 4 shows readiness factor.

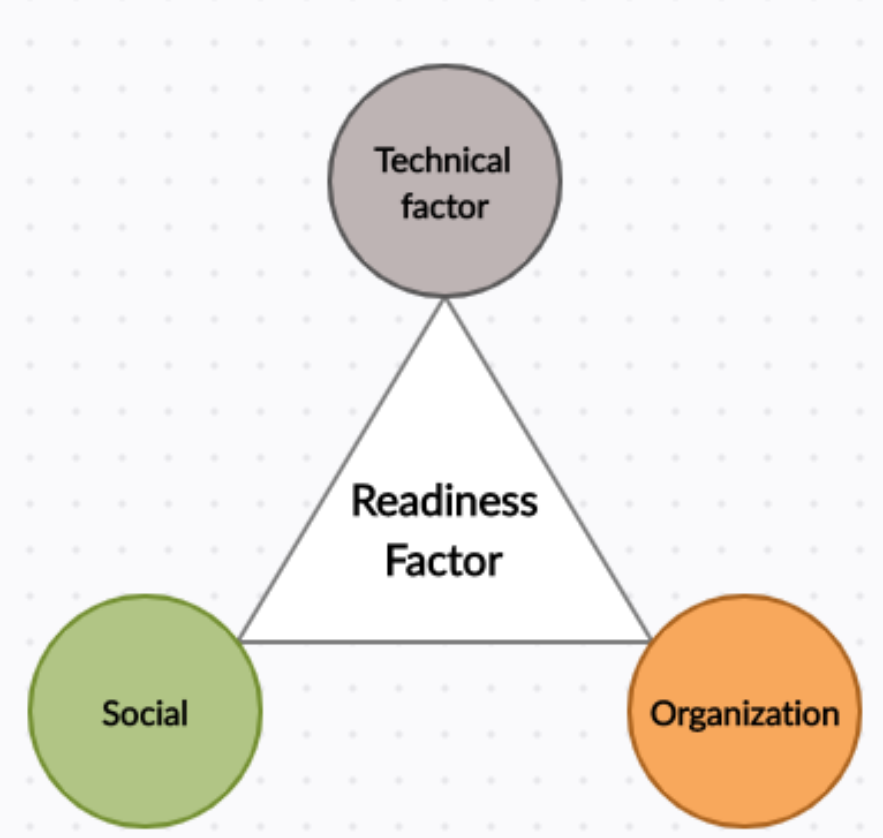

Fig. 3. Readiness Factor

a. **Technical factor:** Hardware, software, content, internet access, bandwidth and school's space.
b. **Organization:** experts, organizational rules, organizational culture and management permanence
c. **Social:** society's conception of E-Learning, governmental rules and administrative instructions

H4: E-learning factor have a direct positive significance to Perceived Ease of Use (PEU).

H5: E-learning factor have a direct positive significance to Perceived Usefulness (PU).

3.4 Perceived Ease of Used

Perceived Ease of Use (PEU) is described as "the degree to which an individual assumes that it would be free of effort to use a specific method" (Davis, 1989)and is similar to the expectation of effort in UTAUT (Venkatesh et al., 2003). PEU was theorized in the TAM, TAM2 and DTPB as a direct BI determinant (Yousafzai, Foxall, & Pallister, 2007). Moreover, a number of researchers have found support for the indirect relationship between PEU and BI through PU. The important position of the PEU in the prediction of the BI was confirmed by clear evidence (Tarhini, Hone, & Liu, 2014).

The majority of subsequent research on student expectations of using technologies support the important position of PEU in predicting the BI. The degree of importance of the results in the literature, however, was different (Ramirez-Anormaliza, Sabaté, & Guevara-Viejo, 2015). Peng, Su, Chou, & Tsai, (2009), for instance, found that PEU was the strongest determinant of the intention to use the scheme, which confirmed the results of the study by Chang & Tung, (2008). It was not, however, the best indicator for the BI to use in the system. Cheney, (2006), on the other hand, concluded that perceived ease of use did not have a clear and substantial effect on the system's intention to use it.

Therefore, the inclusion of the PEU is to explore the expectations of students that the system is effortless and to predict their behavioral intention to use e-learning systems. If students find the system easy to use, it is expected that they are more likely to accept it and use it. Therefore, we suggest the following hypothesis on the basis of several models and previous studies that consider PEU's direct relationship with BI and indirectly through PU:

H6: Perceived Ease of Use (PEU) will have a direct positive significance on the Behavioral intention (BI) to use e-learning System.

H7: Perceived Ease of Use (PEU) will have a direct positive significance on Perceived Usefulness (PU) of e-learning system.

3.5 Perceived Usefulness

Perceived Usefulness (PU) is described as "the degree to which a person believes that it will improve his / her job performance by using a specific method (Davis, 1989). In model DOI and success expectancy in UTAUT, PU is comparable to relative advantage (Venkatesh et al., 2003). In other terms, it is the degree to which advantages are perceived to outweigh costs. PU as a direct determinant of BI was theorized in the TAM, TAM2 and Augmented TAM. PU was shown to have a substantially greater association with BI than perceived ease of use (Davis, 1989) and the same outcome was found in e-learning research (Liu, Chen, Sun, Wible, & Kuo, 2010). Davis (1989) concluded that, because of the functions it does for them, users are often motivated to implement and use the system.

PU will be used in the present sense of the paper to explore the perceptions of the students about the possible advantages of using the e-learning method. The significant principle that PU plays on BI in the use of e-learning resources has been highlighted in several research studies (Chang & Tung, 2008). For instance, applied an extended TAM to investigate the variables that influence the decision to use an online learning community. In predicting the intent to use the web-based learning method, they found that PU was the most influential component. Therefore, if students' perception that the e-learning platform is useful and will add it, it is predicted that they are more likely to follow and use the system to value their education. In comparison, if they are skeptical of their educational value, students can resist educational technologies. It is therefore hypothesized that PU would have a substantial positive effect on the intent to use the e-learning platform. The researcher, then, hypothesized:

H8: Perceived Usefulness (PU) will have a significant positive effect on the Behavioral intention (BI) to use e- learning system.

3.6 Behavioral Intention to Use

Behavior intention characterized as a stage in which a person has developed a deliberate intent to commit or not commit future behavior of certain stated. One of the main differences with TRA is the presence of Behavioral Intention (BI) in TAM. BI is considered to be an immediate precedent of use behaviour and offers an indicator of the readiness of a person to perform a particular behaviour. Ajzen, (1991) argues that" the greater the intention to participate in, as a general rule more probable a behaviour is to be its success. In TAM, both PU and PEU affect the intent of a person to use the technology, which in turn affects the purpose of the individual to use the technology (Davis, 1989).

The connection between BI and usage behaviour in general is considerably confirmed in literature (Taylor & Todd, 1995a,Taylor & Todd, 1995b,Venkatesh & Davis, 2000). This has been applied to the e-learning sense recently (Tarhini et al., 2014,Masa'deh, Tayeh, Al-Jarrah, & Tarhini, 2015). Moreover, the path from BI to AU in TAM, DTPB, and TPB and models is significant. BI has a huge impact on the AU. It is worth noting, however, that the impact of BI on AU is more predictive when people have previous experience with using the technology (Taylor & Todd, 1995b).

System use has been studied as a dependent variable in the sense of information system research and is often calculated by only BI, or only AU, or even both BI and AU (Agarwal & Karahanna, 2000,Szajna, 1994). In the sense of e-learning and similar to previous studies, this study in the theoretical setting considered both BI and AU as dependent variables. BI is expected to have a direct effect on predicting the use behaviour of students in the future to embrace and use the e-learning system. The researcher, therefore, suggests the following hypotheses:

H9: The Behavioral intention (BI) of the student would have a positive influence on his or her Attitude towards use (ATT) of the e- learning method.

3.7 Attitude Towards Use

Attitude can be defined to the 'degree to which an individual has a positive or negative feeling towards e-learning systems (Hussein, 2017). Various researches have shown that attitude has a direct effect on behavioural intention (Fathema, Shannon, & Ross, 2015,Deshpande, Bhattacharya, & Yammiyavar, 2012). The Table 1 summarize all hypothesis formulated:

Table 1 Summarize of Hypotheses

H1a	Age have a direct positive significance on the Behavioral intention (BI) to use e-learning System.
H1b	Gender have a direct positive significance on the Behavioral intention (BI) to use e-learning System.
H1c	Student CGPA will positively affecting the Behavioral intention (BI) to use e-learning System.
H2	E-learning factor have a direct positive significance to Perceived Ease of Use (PEU).
H3	E-learning factor have a direct positive significance to Perceived Usefulness (PU).
H4	E-learning factor have a direct positive significance to Perceived Ease of Use (PEU).
H5	E-learning factor have a direct positive significance to Perceived Usefulness (PU).
H6	Perceived Ease of Use (PEU) will have a direct positive significance on the Behavioral intention (BI) to use e-learning System.
H7	Perceived Ease of Use (PEU) will have a direct positive significance on Perceived Usefulness (PU) of e-learning system.
H8	Perceived Usefulness (PU) will have a significant positive effect on the Behavioral intention (BI) to use e- learning system.
H9	The Behavioral intention (BI) of the student would have a positive influence on his or her Attitude towards use (ATT) of the e- learning method.

4. Discussion

This research presented a theoretical framework that could be useful in explaining the different variables expected to affect the implementation and adoption of e-learning in the context of higher education institutions. The conceptual model is based on the famous models and frameworks of technology adoption that have been already confirm, such as TAM, TAM2, TRA, DTPB and UTAUT that are applicable to the e-learning context. These variables represent personal, social, and situational variables and specifically include e-learning factor, readiness factor, perceived ease of use, perceived usefulness, and behavioural intention and usage. Furthermore, as a set of moderators in the model, demographic profile was incorporated.

This study therefore proposes and tests 10 direct hypotheses between H1 and H10. Extending the TAM to include the e-learning factor and e-learning readiness is expected to help clarify more of the variation in behavioural intention and actual use, as well as to explore explanations why the model might be better than others in certain contexts.

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