System Characteristics and Behavioural Intention to Use E-Learning

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Abstract

Amid the COVID-19 pandemic, most universities worldwide are forced to shift to distance learning and online learning. The purpose of this study is to examine the impact of information quality (IQ), system quality (SYQ) and service quality (SEQ) on perceived ease of use (PEOU) and perceived usability (PU), the impact of PEOU on PU, and the impact of PEOU and PU on behavioural intention to use e-learning. Questionnaires were distributed to the undergraduate students of Cihan University Erbil, and 238 valid questioners were returned. The results indicated the system characteristics, namely SYQ and IQ, significantly impacted PU. In contrast, SYQ and IQ had an insignificant effect on BI to use e-learning. Besides, SEQ had a significant impact on PEOU and an insignificant impact on PU. Additionally, PEOU significantly impacted PU, while PEOU and PU significantly impacted BI to use e-learning. The current research has shown that the intention of implementing an e-learning system for university students is to investigate the student's intentions and objectives.

Keywords: E-Learning, Behavioural Intention, TAM, COVID-19.

Introduction

Nowadays and during the COVID-19 pandemic, the students and universities need e-learning more than ever. COVID-19 has compelled universities all over the world to implement online education. Consequently, universities must respond with various and readily accessible learning methods, such as e-learning and distance learning, while reviving the existing e-learning system. According to UNESCO (2020), university and school closures had several negative repercussions for students, including disrupted learning, depriving development opportunities for students. Correspondingly, online learning solve this challenge with easy access to uninterrupted learning with stable internet connectivity.

E-learning systems are becoming more relevant during this pandemic. Universities can use e-learning features to conduct the teaching process during the pandemic of COVID-19. It also assists schools, colleges, and universities in delivering learning materials and keeping the teaching process running during university closures. Moreover, most of these systems are opened, which will aid in continuous learning during the Coronavirus pandemic.

University students must manage their time wisely to remain updated with the new computer and ICT skills. Students' previous IT knowledge and behaviours toward e-learning are crucial factors in ensuring effective e-learning application (Ghavifekr & Mahmood, 2017). However, the exponential advancement of ICT has resulted in e-learning as the new educational model (Jameel & Moshfeghyan, 2017; Yang, Shao, Liu, & Liu, 2017).

It is essential to comprehend why students employ e-learning as a tool in education, particularly during the pandemic of COVID-19. Based on previous studies, information system (IS) theories described the determinants of users' behaviour towards e-learning adoption and usage (Jameel, Abdalla, Karem, & Ahmad, 2020; Jumaah, Zadain, Zaidan, Hamzah, & Bahbibi, 2018; Kalid et al., 2018).

The context of developed countries was different in term of culture, technology infrastructure and awareness than the developing countries. However, most previous studies were conducted in developed countries, e.g. Al-Fraihat, Joy, Masa'deh, and Sinclair (2020) in the United Kingdom and Tam and Oliveira (2016) in Portugal. Only a few studies were conducted in developing countries (Salloum, Alhamad, Al-Emran, Monem, & Shaalan, 2019). Several other studies were conducted among senior high school students (Liu, Chen, Sun, Wible, & Kuo, 2010), drivers (Man, Xiong, Chang, & Chan, 2020), the frontline police officer (Rui-Hsin & Lin, 2018) and nurses (Tsai, Chao, Lin, & Cheng, 2018).

In developing countries, the e-learning system faced several challenges. In Iraq, the technology infrastructure was weak, and the internet services platform was unreliable (Ahmad, Jameel, & Raewf, 2021; A K Hamzah et al., 2019; Thabit, Raewf, Abdulrahman, & Younis, 2016). Moreover, students' and staff's awareness to use e-learning was also low, which caused unwillingness for e-learning acceptance (Ahmad & Jameel, 2021; Jameel, Hamdi, Karem, Raewf, & Ahmad, 2021; Jasim & Raewf, 2020). In response to the previous arguments, this study aims to determine the factors impacting BI to use e-learning among undergraduate students in the Iraqi context.

Literature Review and Hypothesis Development

TAM discusses whether users embrace or oppose IT based on expected utility and ease of use (Davis, Bagozzi, & Warshaw, 1989). The TAM is the most commonly used and accurate theory for researching, describing, and forecasting how people or users recognize or accept and use IT and the reasons that affect these decisions (Ifinedo, 2017; Tsai et al., 2018). Davis (1985) proposed the theory of TAM, and it consisted of PEOU and PU, Attitude towards Using, BI to Use and Actual Use. The two main elements that assess user intention to use technologies are PEOU and PU (Davis, 1985, 1989). However, the TAM stated that PEOU and PU of information systems are considered primary prerequisites for their use and quality keys concerning user-centred services (Gefen & Keil, 1998). Users' optimistic or pessimistic views toward using technologies are affected by these perceptions (Tsai et al., 2018). According to the TAM theory, a user's understanding of PEOU and PU is critical in deciding user acceptance and implementing IT or systems. As a result, PEOU and PU were used as two variables in students' expectations of e-learning success.

PEOU and PU

PEOU refers to the system's presumed ease of use by people (Davis, 1989). However, it refers to the level to which user assume that using e-learning is easy. According to Davis (1989), PEOU affects the PU of technology and indirectly affects the new technology acceptance. According to Wu and Chen (2005), if users assume the system is easy to understand, they will consider it a useful service. The more straightforward the information system, the greater its usefulness (Rui-Hsin & Lin, 2018). It means a simple e-learning framework is more likely to change users' intentions to use e-learning.

Several previous studies reported that PEOU had a positive and significant impact on PU and indicated strong explanatory power of PEOU on PU (Alshurideh, Salloum, Al Kurdi, Monem, & Shaalan, 2019; Liu et al., 2010; Man et al., 2020; Salloum et al., 2019; Tsai et al., 2018).

H_1: PEOU has a positive and significant impact on PU to use e-learning.

PU, PEOU and Intention to Use E-Learning

The degree to which e-learning supports students in planning learning can be defined as PU. According to Jameel, Abdalla, Karem, and Ahmad (2020), if users had higher PU and PEOU, the intention to use the technology will increase. Venkatesh and Agarwal (2006) investigated internet users' behaviour and determined that user intention would continue to rise if a website regularly updates valuable content. Consequently, the students will regard e-learning for education as beneficial to enhancing efficiency and learning. PU had a

positive and significant impact on usage intention and indicated the PU had a strong explanatory power on e-learning usage intention (Rui-Hsin & Lin, 2018; Salloum et al., 2019; Tsai et al., 2018; Yang et al., 2017). According to Doll and Torkzadeh (1988), the PEOU of information system could enhance and increase users' intention. PEOU enhanced and increased behavioural intention to use, and PEOU had a significant impact on BI (Alshurideh et al., 2019; Liu et al., 2010; Rui-Hsin & Lin, 2018). On the other hand, Yang et al. (2017) failed to prove any significant impact of PEOU on continuous intentions to use e-learning.

H2: PU has a positive and significant impact on BI to use e-learning.
H3: PEOU has a positive and significant impact on BI to use e-learning.

IS Success Model

DeLone and McLean introduced IS Success model in 1992, and to date, the IS is considered one of the effective systems. The model comprised six success dimensions, i.e., IQ, SYQ, system use, user satisfaction, individual impacts, and organizational impacts (DeLone & McLean, 1992). in 2003, DeLone and McLean updated their model. The updated model paid much attention to services quality and net benefit, the updated DeLone and McLean Success Model of IS consisted of IQ, SYQ, SEQ, intention to use, user satisfaction, and net benefits. The model can be used to evaluate the effectiveness of IS in an Internet environment. DeLone and McLean's model is a good foundation for future research, and the model is helpful in various situations and contexts (Petter, DeLone, & McLean, 2008), particularly in the Internet environment. The IS model is one of the most widely used and accepted methods for evaluating user implementation of various information systems (Tsai et al., 2018). Information system science today is commonly considered as one of the most prominent theories.

System Quality (SYQ)

The SYQ includes system query features, transfer speed, response time and access speed for applications and hardware (DeLone & McLean, 1992). SYQ determines how system characteristics such as accessibility, stability, affordability, and adaptability affect users' attitudes about using an e-learning system(Abdulniser Khald Hamzah, Sulaiman, & Hussein, 2013; Jameel & Ahmad, 2020; Jumaah et al., 2018). System quality was also regarded as customers' expectations of a system's performance and efficacy (Man et al., 2020). Reliability, stability, integration, functionality, and timeliness are all consistency components of system quality (Hamzah, Khald, & Hussein, 2021). According to several studies, SYQ characteristics play a critical role in e-learning adoption and use (Alsabawy, Cater-Steel, & Soar, 2016; Damnjanovic, Jednak, & Mijatovic, 2015; Mahmodi, 2017; Salloum et al., 2019). For example, the consistency of web-based resources has an important and positive impact on students' BI (Rafique, Almagrabi, Shamim, Anwar, & Bashir, 2020). As a result, students will only use a mobile library program if it is of good quality. Hence, it can be deduced that device consistency affects technology adoption in developing countries. System inquiry, document delivery rate, feedback duration, and software and hardware access rate are all considerations that should be weighed when determining system output (Rui-Hsin & Lin, 2018; Salman, Zaidan, Zaidan, Naserkalid, & Hashim, 2017).

Man et al. (2020) indicated a positive and significant impact of SYQ on PEOU but not on PU. Lin, Fofanah, and Liang (2011) explained that the relationship between the SYQ and PU could exist if the public regards a digital system's rapid inquiry feature as good. Based on such perception, then the system and its facilities would be regarded as valuable. The study conducted in the UAE indicated the SYQ had a positive and significant impact on PEOU and PU among students (Alshurideh et al., 2019; Salloum et al., 2019). Similarly, SYQ had strong explanatory power on PU and PEOU (Rui-Hsin & Lin, 2018; Tsai et al., 2018; Yang et al., 2017) and PU (Tsai et al., 2018). However, SYQ had a positive impact on PEOU but an insignificant impact on PU among students in the higher education context (Salloum et al., 2019). Based on previous empirical results, there is inconsistency regarding the impact of SYQ on PU and PEOU.

H4a: SYQ has a positive and significant impact on the PU of e-learning.
H4b: SYQ has a positive and significant impact on the PEOU of e-learning.

Service Quality (SEQ)

SEQ involves the assistance available to a system's user (Jameel & Ahmad, 2020). Earlier researchers showed that SEQ significantly impacted PU but not PEOU in a study comprising UAE students (Alshurideh et al., 2019). Al-Fraihat et al. (2020) and Yang et al. (2017) further buttressed the positive and significant impact of SEQ on PU and PEOU (Chi, 2018). However, Chi (2018) and Tsai et al. (2018) found an insignificant impact of SEQ on PU and PEOU. Hence, there is inconsistency whether SEQ had a significant or insignificant impact on PU and PEOU.

H$_{5a}$: SEQ has a positive and significant impact on the PU of e-learning.
H$_{5b}$: SEQ has a positive and significant impact on the PEOU of e-learning.

Information Quality (IQ)
According to DeLone and McLean (1992, 2003), IQ refers to the completeness, protection, comprehensibility and easiness of a system's information performance, as well as its reliability, accuracy, and timeliness. In e-learning, IQ provides information relevant to learning, making it easy for the learner to understand. A system's capacity to provide accurate and extensive knowledge for learning is regarded as information quality (Rui-Hsin & Lin, 2018). Users who consider an e-learning system capable of delivering reliable information and expertise would interpret the system as useful if it offers pluralistic and efficient courses (Jameel et al., 2020). Users with good information management experience can find the interface easy to use (Rui-Hsin & Lin, 2018). This condition would make the learning process simpler and reduce the mental and physical work needed to learn. Rui-Hsin and Lin (2018) reported a significant impact of IQ on PU and PEOU. Meanwhile, (Rui-Hsin & Lin, 2018) indicated that IQ had strong explanatory power on PU and PEOU. The study conducted among students from two private universities in UAE reported that IQ significantly impacted PU and PEOU (Alshurideh et al., 2019). In consistence, another study conducted among students from five UAE universities showed that IQ had a significant impact on PU and PEOU (Salloum et al., 2019). More evidence further verified that IQ positively and significantly impacted PU (Al-Fraihat et al., 2020; Tsai et al., 2018) and PEOU (Tsai et al., 2018). Conversely, IQ had an insignificant impact on PU (AlBar & Hddas, 2018) and PEOU (Chen, Shu, & Lee, 2019). Previous findings showed that there is inconsistency regarding the impact of IQ on PU and PEOU. Thus, the current work tries to confirm it and proposes the following hypotheses.

H$_{6a}$: IQ has a positive and significant impact on the PU of e-learning.
H$_{6b}$: IQ has a positive and significant impact on the PEOU of e-learning.

Methodology

The study employed the positivism paradigm as it empirically and quantitatively measured the variables. The study applied deductive reasoning because the study proposed to test nine hypotheses. Consistently, this study used a questionnaire to collect the data to save researchers' time and effort and, more importantly, test many variables. The target population of the current study was the undergraduate students of the academic year 2020-2021 from Cihan University -Erbil, Iraq. There were 5,226 students enrolled at Cihan university (Cihan university-Erbil, 2021) and based on Krejcie and Morgan (1970), the appropriate sample size was 358 students. Of the 358 questionnaires distributed among the students, only 247 returned, indicating a 69% response rate. However, only 238 questionnaires valid for analysis after data screening. The study used two main software; SPSS for data entry, coding, handling missing value, identifying outlier, testing normality assumptions and performing descriptive analysis. Meanwhile, the second software is AMOS hypotheses test. The research instrument illustrated in Table 1. Table 1 also listed six variables investigated and the number of items for each construct.

Results
Measurement Model

This study proposed a model consisting of six latent constructs PEOU, PU, BI, SYQ, SEQ and IQ, in which all six constructs are first order and reflective. Table 1 depicted the CFA results where most of the items exceeded 0.6 cut-off level of factor loadings (Hair et al., 2016). Several items (SYQ 1,2,3, SEQ4 and PEOU 5) with low factor loadings were removed.

According to Hair et al. (2016), the measurement model should examine the convergent validity, composite reliability (CR), discriminant validity and AVE. The cut-off level of CR is 0.70 (Hair et al., 2016). Based on Table 1, the CR of all the constructs were more than 0.7. Besides, AVE refers to the amount of variance, and the minimum cut-off level is 0.5. Table 1 showed that all constructs exceeded the 0.5 cut-off value. Moreover, the validity of the constructs was assessed based on model fit indices. Figure 1 illustrated all the required indices were achieved (RMSEA 0.065 <0.08, CFI =0.932>0.90, TLI = .923>0.90, CMIN/DF = 1.833 between 1 and 3 while only the GFI 0.824) and according to (Awang, 2014), if three indices were achieved, the analysis could proceed to next step.

Table 1. Validity and Reliability

constructs	Items	FC	CR	AVE	Source
IQ	IQ1 IQ2 IQ3 IQ4 IQ5	.853 .852 .750 .810 .763	0.903	0.652	(Al-Fraihat et al., 2020; Yang et al., 2017)
SYQ	SYQ4 SYQ5 SYQ6 SYQ7 SYQ8	.678 .776 .911 .905 .830	0.913	0.681	(Al-Fraihat et al., 2020; Yang et al., 2017)
SEQ	SEQ1 SEQ2 SEQ3 SEQ5	.719 .878 .621 .672	0.817	0.532	(Al-Fraihat et al., 2020; Yang et al., 2017)
BI	BI1 BI2 BI3 BI4 BI5	.685 .858 .843 .836 .754	0.897	0.638	(Davis, 1989)
PU	PU1 PU2 PU3 PU4 PU5	.601 .883 .908 .794 .632	0.879	0.600	(Davis, 1989)
PEOU	PEOU1 PEOU2 PEOU3 PEOU4	.975 .969 .896 .728	0.943	0.806	(Davis, 1989)

Table 2 depicted the discriminant validity as highlighted in bold for each construct. It showed that each construct correlated with itself higher than the constructs, indicating the validity was achieved as recommended by Fornell and Larcker (1981).

Table 2. Discriminant Validity

Constructs	IQ	SYQ	SEQ	BI	PU	PEOU
IQ	**0.807**					
SYQ	0.431	**0.825**				
SEQ	0.238	0.200	**0.730**			
BI	0.448	0.423	0.332	**0.799**		
PU	0.593	0.442	0.263	0.448	**0.774**	
PEOU	0.211	0.208	0.283	0.409	0.377	**0.898**

Structural Model

The aim of analyzing the structural model is to examine the path analysis. According to Table 3 and Figure 1, the first hypothesis indicated the PEOU had a significant impact on PU. The *p*-value .000 <0.05;thus, H_1 was supported. H_2 and H_3 showed the PU (*p*-value .000 < 0.05, and PEOU *p*-value .000 < 0.05) had significant impact on BI; thus, H_2 and H_3 were supported.

SYQ had a significant impact on PU (*p*-value .0042 < 0.05) but an insignificant impact on PEOU (*p*-value .1355 < 0.05). Thus, H_{4a} was supported and H_{4b} was not supported. SEQ exhibited an insignificant impact on PU as the *p*-value .3664 > 0.05;thus, H_{5a} was not supported. Additionally, SEQ had a significant impact on PEOU as the *p*-value .0023 < 0.05 and the T-value 3.041 > 1.96; thus, H_{5b} was supported.

Although, IQ had a significant impact on PU (*p*-value .000 < 0.05), it did not have a significant impact on PEOU (*p*-value .186 > 0.05). As a result, H_{6a} was supported, while H_{6b} was not supported.

Table 3. Results of Structural Model

| Hypotheses				Estimate	SE.	CR.	P	Label
H1	PU	<---	PEOU	.124	.035	3.524	.000	Supported
H2	BI	<---	PU	.506	.111	4.521	.000	Supported
H3	BI	<---	PEOU	.206	.054	3.773	.000	Supported
H4a	PU	<---	SYQ	.166	.058	2.857	.0042	Supported
H4b	PEOU	<---	SYQ	.178	.119	1.492	.1355	Not Supported
H5a	PU	<---	SEQ	.055	.061	.9031	.3664	Not Supported
H5b	PEOU	<---	SEQ	.396	.130	3.041	.0023	Supported
H6a	PU	<---	IQ	.440	.079	5.571	.000	Supported
H6b	PEOU	<---	IQ	.183	.138	1.321	.1863	Not Supported
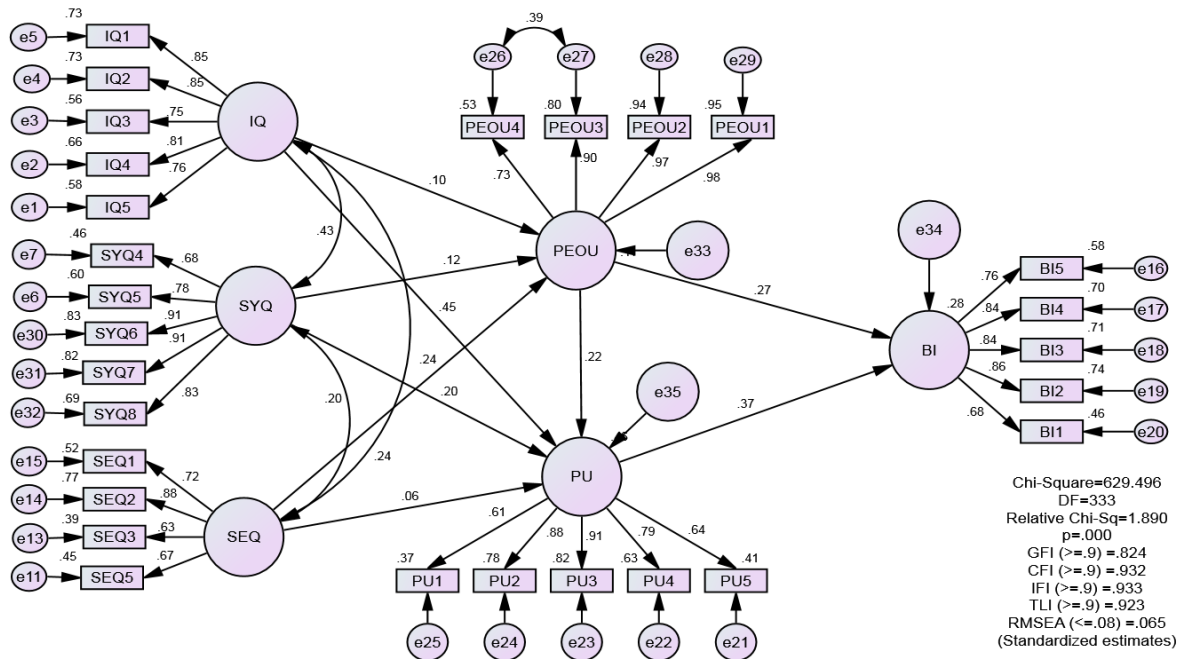
Figure 1. Structural Model

Discussion

The results indicate the PEOU has a significant impact on PU, which supported the previous findings (Man et al., 2020; Salloum et al., 2019; Tsai et al., 2018). When users consider a system as simple and easy to use, it will lead them to perceive it as useful for solving their tasks. In response, the universities should develop an easy system for average users and provide training to get the students familiar with the system. PU and PEOU indicate a significant impact on BI, as reported by several studies (Alshurideh et al., 2019; Liu et al., 2010; Rui-Hsin & Lin, 2018). When students recognize the system as easy and useful, it will increase their intention to use it. However, universities should also improve the system to generate higher quality, ease of use and benefits of using the system.

SYQ has a significant impact on PU, which in line with the results of several prior studies (Rui-Hsin & Lin, 2018; Salloum et al., 2019; Tsai et al., 2018). The usefulness of system features like recording, delivery speed should all be part of a quality e-learning system. The respondents assumed that e-learning would be beneficial if the technology had a high system efficiency and usefulness. On the other hand, the current study reported an insignificant impact of SYQ on PEOU that contradicted most previous findings (Man et al., 2020; Rafique et al., 2020; Salloum et al., 2019). These studies also found a significant impact of SYQ on PEOU. These results may reflect that most of the students have enough experience and skills to use the technology, and they believe PEOU does not impact their intention to use e-learning.

SEQ has a significant impact on PEOU, which corroborated a prior finding (Chi, 2018). If the students believe the network output is reasonably decent and safe, they may believe the system service is more useful. On a different note, SEQ has an insignificant impact on PU, which aligns with the previous studies (Chi, 2018; Tsai et al., 2018). The Moodle platform provided by Cihan University to students was widely used in the field of education nowadays. Meanwhile, Moodle made several upgrades that smoothen students' learning experience.

IQ has a significant impact on PU. This result is in line with prior results (Salloum et al., 2019; Tsai et al., 2018). It means that a good IQ allows for better comprehension of course material, which improves the system's perceived usability. The e-learning system offers accessible learning resources and well-designed courses to the students, allowing the e-learning system for instruction and training seem straightforward and accessible to the students. Additionally, the current study reported that IQ has an insignificant impact on PEOU, which

confirmed the result reported by Chen et al. (2019). This result may indicate that the students are familiar with the system and technology and feel the quality of information does not impact their attitude toward the system's ease of use.

Conclusion

Using a bespoke longitudinal dataset of 238 students from Cihan university-Erbil, this study examined how well the TAM, IS performance model (SYQ, SEQ and IQ), and the BI to use e-learning fit together. The results indicated the PU, PEOU, IQ, SYQ, and IQ were important constructs that lead to an enhance in BI to use e-learning among undergraduate students. The results highlight essential considerations in determining whether a university can improve and implement e-learning to its students or not. The current research has shown that the intention of implementing an e-learning system for university students is to investigate the student's intentions and objectives.

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