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Factors Affecting Intention to Use E-Learning Systems in Selected Universities in Phnom Penh, Cambodia

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Abstract

This research investigates factors influencing the intention to use e-learning systems in selected universities in Phnom Penh, Cambodia. The conceptual framework has been developed by adopting previous theoretical studies and research models of the modified unified theory of acceptance and use of technology (UTAUT2). Five hundred questionnaires were collected from undergraduate students through Google form survey with universities' administration assistance. Multi-stage sampling was used: the first stage is stratified random sampling followed by purposive sampling. Collected data were analyzed using the Structural Equation Model (SEM) and Confirmatory Factor Analysis (CFA) to confirm the model fit and hypothesis testing. The findings showed that performance expectancy, effort expectancy and self-efficacy did not have any influence on behavioral intention. However, social influence had the strongest influence on behavioral intention to use e-learning systems, followed by facilitating conditions. Moreover, facilitating conditions and behavioral intention had a significant influence on use behavior of e-learning systems. This study provided theoretical implications for researchers related to technology adoption and information for training institutions, universities, schools and academic staff on issues they need to focus on when they wish to launch any new system or online services.

Keywords: e-learning, performance expectancy, effort expectancy, self-efficacy, social influence, facilitating conditions

Introduction

Educational landscape globally evolves with the fast-changing information and communication technology-ICT and the use of ICT such as distance education, online learning and e-learning has been significant. ICT keeps on evolving; therefore it requires the attention of educators and learners for constant assessment of its effectiveness and contribution to the educational system (Marshall, et al., 2010). In the recent lockdown due to COVID-19 pandemic, e-learning was strategically used to continue providing education around the world and this is no different for Cambodia. Due to the pandemic, the classroom meeting was interrupted but the courses need to be delivered as scheduled according to timeframe, thus, Cambodia has applied the e-learning approach in all levels of education since early 2020. Though e-learning has just been fully applied for 2 years, this approach had started in 2004 for providing training through a project for delivering tertiary educational opportunities to underprivileged provincial students. The Royal Government of Cambodian has also promoted ICT use in this sector. With its success, a master plan for ICT in education was developed in 2010 to promote ICT for primary level to higher education combining other aspects of distance education, online learning and e-learning (Sethy, 2010). The Education Strategic Plan 2019 - 2023 is committed to achieving education reforms from 2030 onward in line with socio-economic development and the reforms of the Royal Government of Cambodia; this framework encourages universities in Cambodia to adopt digitalized and innovative approaches for learning and teaching, which is prioritized on the appropriate application of ICT. This study investigates factors influencing intention to use e-learning system in selected universities in Phnom Penh, Cambodia. The findings of this research can be used as a reference for training academic staff in institutions, universities, and schools to explore appropriate ways to encourage students to use e-learning platform in learning.

Research Objectives

The research objectives of this study are:

1. to identify factors that influence behavioral intention to use e-learning systems
2. to identify the most influential factors that influence behavioral intention to use e-learning systems
3. to study the influence of facilitating conditions and behavioral intention on use behavior of e-learning systems.

Research Questions

To realize these objectives, these questions would be answered.

1. What factors influence behavioral intention to use e-learning systems among undergraduate students in the three selected private universities in Phnom Penh, Cambodia?
2. What are the most influential factors that influence behavioral intention to use e-learning systems?
3. Do facilitating conditions and behavioral intention influence use behavior of e-learning systems?

Literature Review

Performance Expectancy

Performance expectancy is how people believe their performance will be upgraded when the system is used (Venkatesh, et al., 2003). This study defines performance expectancy as the degree to which students believe their study performance will be better when using e-learning. According to Venkatesh, et al. (2003), pperformance expectancy was the strongest determinant of individual behavior to use a technology. It was captured from different concepts including perceived usefulness, job-fit, relative advantage. Within the educational sector, performance expectancy helps students access information promptly within their convenient places. When students use e-learning, they want efficiency and effectiveness in their studies. Many studies using the UTAUT model showed that performance expectancy was the strongest determinant of individual intention to use a technology (Davis, 1989; Lakhal, et al., 2013; Nair, et al., 2015; Samsudeen & Mohamed, 2019; Tarhini, et al., 2017; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Venkatesh, et al., 2003). However, performance expectancy significantly influenced individual behavioral intention only if moderated by individual internet experience. There is an increasing impact of performance expectancy on behavioral intention when users possess greater internet experience (AlAwadhi & Morris, 2008).Thus, the following hypothesis was formulated.

H_1: Performance expectancy has a significant influence on behavioral intention to use e-learning systems.

Effort Expectancy

Effort expectancy is the degree of ease when people use the system (Venkatesh, et al., 2003). In this study, effort expectancy is defined as the extent of ease when students use e-learning. This construct was captured from complexity and ease of use. Many research argued that effort expectancy significantly influenced an individual's intention to use a technology (Davis, 1989; Samsudeen & Mohamed, 2019; Tarhini, et al., 2017; Yakubu & Dasuki, 2019). Dwivedi, et al. (2019) had identified that effort expectancy significantly determined attitude towards technology use; however it had no significant impact on individual behavioral intention (Wiafe, et al., 2019). The following hypothesis was thus, formulated.

H_2: Effort expectancy has a significant influence on behavioral intention to use e-learning systems.

Self-Efficacy

Self-efficacy is an individual's judgement of own competence to perform required actions to produce specific performance attainments (Bandura, et al., 1999). In this study, self-efficacy can be defined as the judgement of people's competence to perform required actions to produce learning achievement. Many studies showed that self-efficacy significantly influenced behavioral intention to use technology (Alsharif, 2013; Compeau & Higgins, 1995; Kocaleva, et al., 2015; Tarhini, et al., 2017). However, other researchers found that self-efficacy did not significantly influence behavioral intention to use technology (Wiafe, et al., 2019). Other studies also showed self-efficacy did not significantly influence behavioral intention to use technology as this significant relationship

is linked to the area and relevant culture (Maddux, et al., 1982; Venkatesh, et al., 2003). The next hypothesis was:

H_3: Self-efficacy has a significant influence on behavioral intention to use e-learning systems.

Social Influence

Social influence is the degree to which an important person influences others to use a technology (Venkatesh, et al., 2003). Since people spend most of the time together, they can influence each other. Social influence in this study can be defined as the extent of the belief that administrative staff of universities or lecturers can influence students to use e-learning. This construct was developed from previous models capturing the notion of subjective norm, social factors and image. There was a significant relationship between social influence and behavioral intention if technology use is mandatory (Venkatesh, et al., 2003) as confirmed by other studies which expressed that this construct was an important factor in determining technology adoption (Ajzen, 1991; Kocaleva, et al., 2015; Samsudeen & Mohamed, 2019; Tarhini, et al., 2017; Umrani-Khan & Iyer, 2009; Venkatesh & Davis, 2000). However, a study to examine healthcare professionals' decisions about telemedicine technology showed that this construct did not significantly influence behavioral intention to use the technology (Chau & Hu, 2002). Thus, the following hypothesis was formulated.

H_4: Social influence has a significant influence on behavioral intention to use e-learning systems.

Facilitating Conditions

Facilitating condition is the level of observation to use organizational or technical infrastructures assisting students to use a technology (Venkatesh, et al., 2003). Facilitating conditions can be defined as the degree of perception to use organizational and technical infrastructures to help students use e-learning. Many studies showed that this construct strongly influenced behavior intention and use behavior depending on the availability of relevant resources (Ali, et al., 2016; Raman, et al., 2014; Umrani-Khan & Iyer, 2009). Moreover, Jong and Wang (2009) who studied the student's acceptance of the web-based system in Taiwan university and Lakhal, et al (2013) who investigated the psychological factors on the adoption of desktop video conferencing in Canada, revealed that facilitating conditions positively influenced intention to use technology. Furthermore other studies showed that facilitating conditions significantly influenced technology use (Kocaleva, et al., 2015; Moore & Benbasat, 1991; Samsudeen & Mohamed, 2019). However, Venkatesh, et al. (2003) revealed that facilitating condition was insignificant when performance expectancy and effort expectancy were presented in the same model, supported by a study of citizens' behavioral intention in adopting e-government services in Qatar (Shafi & Weerakkody, 2009). Moreover, a study of e-government service adoption in Kuwait also showed that facilitating conditions did not influence behavioral intention but had an effect on use behavior (AlAwadhi & Morris, 2008; Tarhini, et al., 2017). Two studies confirmed this; the study about the factors influencing information technology acceptance in health canters in Thailand (Kijsanayotin,

et al., 2009) and the study of the factors influencing e-learning adoption of students in Nigeria (Yakubu & Dasuki, 2019). Therefore, the following hypotheses were formulated.

H_{5a}: Facilitating conditions have a significant influence on behavioral intention to use e-learning systems.

H_{5b}: Facilitating conditions have a significant influence on the use behavior of e-learning systems.

Behavioral Intention

Behavioral intention is the extent to which people possibly apply a technology (Venkatesh, et al., 2003) or students' willingness to make a specific action (Davis, et al., 1989). This construct can be considered as the degree to which students possibly use e-learning. Many studies found that behavioral intention significantly determined use behavior or actual use (Kocaleva, et al., 2015; Samsudeen & Mohamed, 2019; Umrani-Khan & Iyer, 2009). However, the individual must be able to perform any behavior first before making any behavior performance (Fogg, 2009). Hence, forming the right behavior intention does not guarantee behavior performance. Furthermore, individual needs to have a positive attitude about current behavior transformation to new behavior (Wiafe, et al., 2019). With this premise, the following hypothesis was formulated.

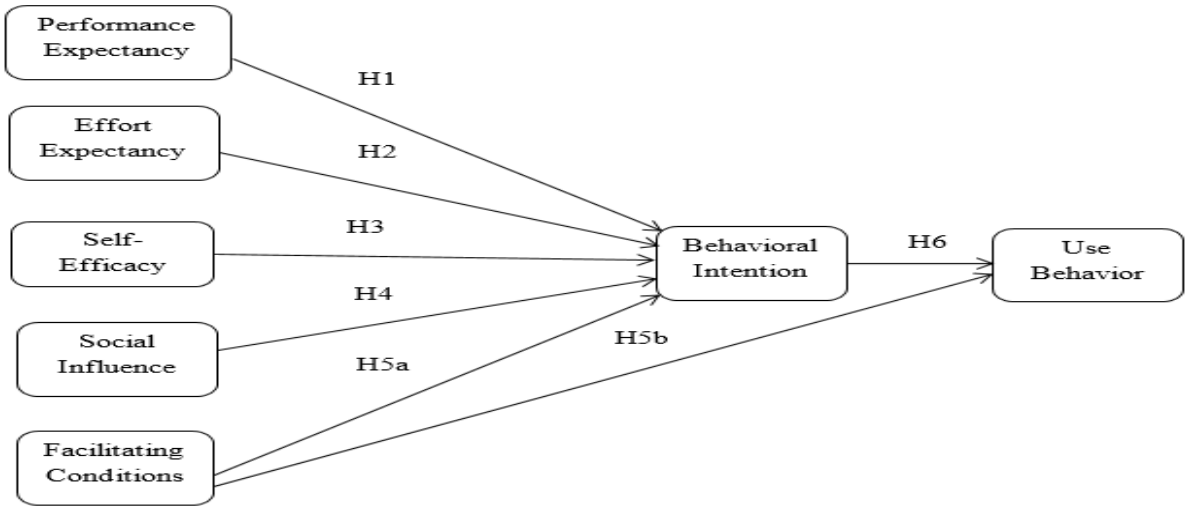
H_6: Behavioral intention has a significant influence on the use behavior of e-learning systems.

Research Framework

Referring to previous theoretical studies and technology acceptance models, the researchers have adopted the modified unified theory of acceptance and use of technology (UTAUT2). The researchers have also developed the conceptual framework to explain the factors influencing the intention to use e-learning systems in selected universities in Phnom Penh, Cambodia. The conceptual framework constructs are performance expectancy, effort expectancy, self-efficacy, social influence, facilitating conditions, behavioral intention, and use behavior.

Figure 1

Conceptual Framework



Note. Constructed by the author (2022).

Research Methodology

Research Design

The study has applied a quantitative research approach by using a questionnaire as a survey tool for data collection. Before the distribution of the questionnaire, the content validity of the questionnaire was done using Item-Objective Congruence (IOC) test by three experts and a pilot test with 50 respondents was conducted to determine the Cronbach's Alpha coefficient to determine the questionnaire's reliability. The questionnaires were distributed through Google forms to university administrators to coordinate and send to any contact groups of students in each selected university. Five hundred undergraduate students in year three and four were chosen as the research sample size. The questionnaire contains three parts: the first part is screening questions to ensure that the respondents have met the requirements of the target respondents; the second part consists of questions for research constructs using the Five-point Likert scale (5= Strongly Agree, 4= Agree, 3=Neutral, 2= Disagree, and 1= Strongly Disagree). In this study, there are thirty items: five items for performance expectancy, four items for effort expectancy, four items for self-efficacy, four items for social influence, five items for facilitating conditions, five items for behavioral intention and three items for use behavior. The last part asks for demographic information about the target respondents.

The data were analyzed using statistical package software SPSS and AMOS v21. Confirmatory Factor Analysis (CFA) for each construct's convergent and discriminant validity and Structural Equation Model (SEM) were calculated to test for significant relationship among the constructs.

Population and Sample Size

The target population for this study is undergraduate university students studying in the third and fourth year in three selected universities in Phnom Penh, Cambodia, who have experience in

using e-learning system. In this study, the sample size was determined by parameter values calculated using the A-priori Sample Size Calculator for Structural Equation Models from danielsoper's website (Soper, 2019). After filling all necessary information in the calculator, the expected result size aimed at 0.2, statistical power at 0.8, number of latent variables at 7, number of observed variables at 30, and probability scale at 0.05. The minimum sample calculated was 425, the minimum sample for model structure was 90 and the recommended minimum sample was 425. Therefore, the researcher aimed to collect 500 samples for better statistical result as illustrated in table 1.

Sampling Technique

Multi-stage sampling was used in this study. Stratified random sampling was used to choose undergraduate students in year three and four as the data sources and purposive sampling was used in the second stage to choose undergraduate students who understood questions in the questionnaire (Tongco, 2007) or whose ideas are linked to the discussing topics (Jankowicz, 1995) from the three private universities in Phnom Penh, Cambodia; Norton university, Western university and Cambodian Mekong university. Moreover, stratified random sampling linked to the division of a population into small sub-groups. As each university administrator has created the contact groups of students, the questionnaires were sent to the university administrators who sent the questionnaires to the contact groups of students in the three private universities in Phnom Penh, Cambodia. The link to the Google forms survey was sent to each contact group of students. The survey was conducted from September to November 2021.

Pilot Test

Cronbach's Alpha reliability test was applied to measure items of each construct in the questionnaire. The researchers conducted pilot testing by requesting 50 respondents to answer the questionnaire. Responses were analyzed using SPSS AMOS v21 as a statistical tool. The results of Cronbach's Alpha Coefficient are in Table 2. The reliability scores were from 0.640 to 0.806, greater than 0.60 (Sekaran & Bougie, 1992), this confirmed the internal consistency of the items in the questionnaire.

Table 1
Population and Sample Size by University

University	Population Size	Proportionate Sample Size
	Number of Student	Number of Student
Norton University	3,692	330
Western University	1,052	94
Cambodian Mekong University	849	76
Total	5,593	500

Table 2
Cronbach's Alpha Value of Each Construct

Construct	Cronbach's alpha	Strength of Association
Performance expectancy	.806	Very good
Effort expectancy	.794	Good
Self-Efficacy	.719	Good
Social influence	.806	Very good
Facilitating conditions	.762	Good
Behavioral intention	.751	Good
Use behavior	.640	Moderate

Results and Discussion

Demographic Information

Among the 500 respondents, 60.4% were male students and 39.6% were female students. 75.6% of the respondents were between the age of 20 to 22, 20.2% were between the age of 23 to 25, and just 4.2% of the respondents were above 25 years old. Moreover, 61.8% of the respondents were in their third year and 38.2% were in their fourth year of study. All of the respondents have their own computer or laptop or smartphone.

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis, or CFA was used to test the convergent and the discriminant validity of the scales. Table 3 shows the factor loadings, composite reliabilities (CRs) and average variance extracted (AVE). The results showed that CRs were higher than the minimum limit of 0.60. Furthermore, all constructs had AVE between 0.433 and 0.794 even though, some constructs had the AVE lower than the recommended limit of 0.50 (Fornell & Larcker, 1981). Nevertheless, their CR values were greater than 0.6; this shows that the convergent validity of construct is still acceptable (Lam, 2012).

Table 3
Confirmatory Factor Analysis (CFA), Composite Reliability (CR), and Average Variance Extracted (AVE)

Constructs	No. of Item	Cronbach's Alpha	Factor Loadings	CR	AVE
Performance expectancy (PE)	5	0.872	0.686–0.809	0.874	0.581
Effort expectancy (EE)	4	0.794	0.696–0.725	0.795	0.493
Self-efficacy (SE)	4	0.849	0.693–0.848	0.843	0.575
Social Influence (SI)	4	0.845	0.625–0.752	0.765	0.439
Facilitating Conditions (FC)	5	0.852	0.568–0.716	0.787	0.574
Behavioral Intention (BI)	5	0.879	0.622–0.748	0.873	0.591
Use behavior (UB)	3	0.692	0.597–0.722	0.819	0.476

Note: Composite Reliability (CR) and Average Variance Extracted (AVE)

According to Fornell and Larcker (1981), the researcher needs to compare the squared correlation of a pair of constructs with AVE for each pair of constructs and the discriminant validity was created if the squared correlation was smaller than the AVEs. However, if the squared correlation was greater than the AVEs by 0.009, it can be ignored (Rahim & Magner, 1995). The discriminant validity was established when the square root of each AVE in the diagonal with the correlation coefficients for each construct in the relevant rows and columns has a greater value than the correlations with other constructs (Hair, et al., 2016), as illustrated in table 4.

Table 4

Discriminant Validity

Factor Correlations							
Constructs	**PE**	**EE**	**SE**	**SI**	**FC**	**BI**	**UB**
PE	**0.762**						
EE	0.695	**0.702**					
SE	0.665	0.690	**0.758**				
SI	-0.007	0.003	0.059	**0.662**			
FC	0.025	-0.021	-0.019	0.613	**0.757**		
BI	0.084	0.135	0.119	0.652	0.623	**0.690**	
UB	-.069	0.034	0.105	0.119	0.046	0.227	**0.658**

Note: The diagonally listed value is the AVE square roots of the variables

Structural Equation Model (SEM)

The researcher relied on the literature review to create a theoretical model as the base model then applied SEM to analyze and test the model. Moreover, SEM is an approach that can be used to investigate the relationships among multiple constructs. Furthermore, the data were collected, and the reliability and validity of the measures were tested by using CFA. As the measurement model was valid, SEM was used to test the proposed hypotheses. Goodness of fit indices is shown in table 5.

Table 5

Goodness of Fit

Index	Criterion	Statistical Value
CMIN/DF	< 3.00 (Hair, et al., 2006)	1.589
GFI	≥ 0.90 (Hair, et al., 2006)	0.924
AGFI	≥ 0.90 (Hair, et al., 2006)	0.907
NFI	≥ 0.90 (Arbuckle, 1995)	0.911
CFI	≥ 0.90 (Hair, et al., 2006)	0.965
TLI	≥ 0.90 (Hair, et al., 2006)	0.960
RMSEA	< 0.05 (Browne & Cudeck, 1993)	0.049
RMR	< 0.05 (Hair, et al., 2006)	0.036

Note: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean square error of approximation, and RMR = root mean square residual

Research Hypotheses Testing

The regression weight was then used to measure the significance of the causal relationship between variables (Fornell & Larcker, 1981). The hypotheses testing results indicated that some proposed hypotheses were supported at the significant level of p=0.05, except for H1, H2, and H3. Furthermore, social influence was the strongest predictor of behavioral intention to use e-learning systems, followed by facilitating conditions. Moreover, facilitating conditions and behavioral intention influenced the use behavior of e-learning systems. The causal relationships are illustrated in table 6.

Table 6

Hypotheses Result of the Structural Model

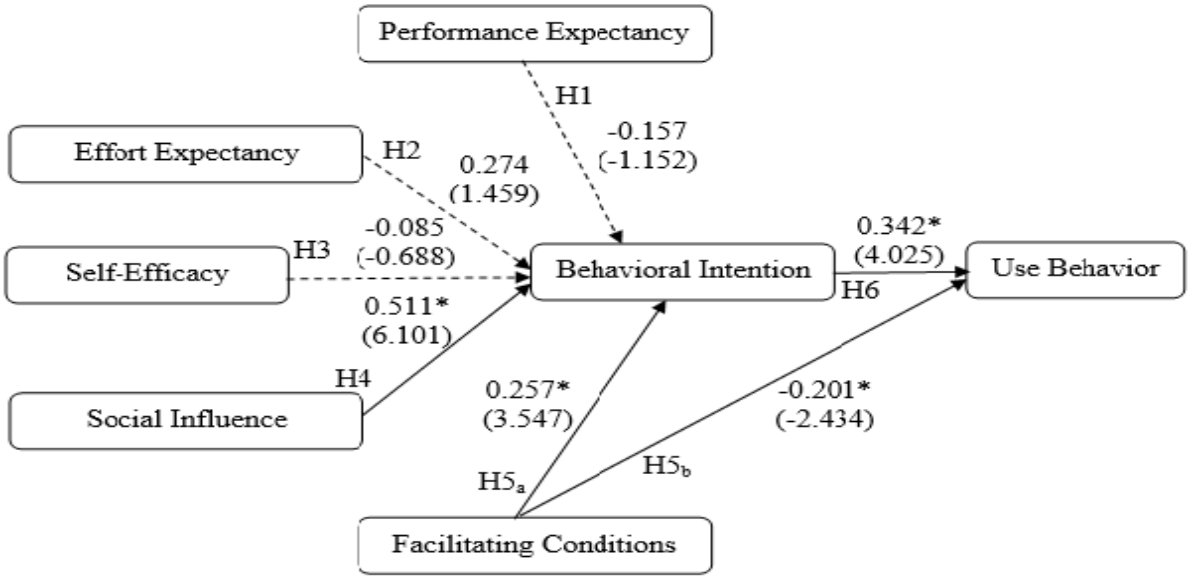
Hypothesis	Standardized path coefficient (β)	t-value	Test result
H1: Performance expectancy (PE)→ Behavioral intention (BI)	-.157	-1.152	Not Supported
H2: Effort expectancy (EE)→ Behavioral intention (BI)	0.274	1.459	Not Supported
H3: Self-efficacy (SE)→ Behavioral intention (BI)	-0.085	-0.688	Not Supported
H4: Social influence (SI)→ Behavioral intention (BI)	0.511	6.101*	Supported
$H5_a$: Facilitating conditions (FC) → Behavioral intention (BI)	0.257	3.547*	Supported
H5b: Facilitating conditions (FC) → Use behavior (UB)	-0.201	-2.434*	Supported
H6: Behavioral intention (BI)→ Use behavior (UB)	0.342	4.025*	Supported

Note. *=p-value<0.05

From table 6, it is shown that social influence and facilitating conditions strongly influenced behavioral intention to use e-learning systems which was consistent with many studies (Ahmad, et al., 2013; Dwivedi, et al., 2019; Kolog, et al., 2015; Kurfalı, et al., 2017; Rana, et al., 2017; Samnang, et al., 2021; Wang & Shih, 2009). Furthermore, facilitating conditions also significantly influenced the use behavior which was consistent with some studies of Weerakkody, et al.(2009), Samsudeen and Mohamed (2019), and Yakubu and Dasuki (2019). In addition, behavioral intention to use e-learning systems had a significant impact on the use behavior of e-learning systems, consistent with many studies of Umrani-Khan and Iyer (2009), Samsudeen and Mohamed (2019), Kocaleva, et al. (2015), Kijasanyotin, et al. (2009) and Nair, et al. (2015). However, the other three constructs did not influence behavioral intention to use e-learning systems, namely, performance expectancy, effort expectancy and self-efficacy which were found not to have a significant impact on behavioral intention to use e-learning systems, which was consistent with previous findings of Carter and Belanger (2005), Rana, et al (2017), Wiafe, et al. (2019), Kolog, et al. (2015) and Kurfali, et al. (2017).

Figure 2

The Results of Structural Equation Modeling



Note: Solid line indicates the Standardized Coefficient with * as p<0.05, and t-value in Parentheses; Dash line indicates Not Significant.

From figure 2, it is shown that two constructs: social influence and facilitating conditions influenced behavioral intention to use e-learning system. Social influence provided highest total effect on behavioral intention, followed by facilitating conditions, indicating that social influence was the most influential factor influencing behavioral intention to use e-learning system. Furthermore, the direct effect of facilitating conditions and behavioral intention on the use behavior of e-learning systems was -0.201 and 0.342 respectively. For the total effect, behavioral intention has highest total effect on use behavior showing that behavioral intention to use e-learning systems strongly influenced use behavior of e-learning systems.

Conclusions and Recommendations

This study examined factors influencing the intention to use the e-learning system in three selected private universities in Phnom Penh, Cambodia. Results of the study can contribute to the theories and literature on technology adoption with a focus on the education sector. Moreover, during the COVID-19 pandemic, e-learning has been strategically used to continue providing education around the world and this is not different for Cambodia. However, the advantages of e-learning system are linked to the adoption and Cambodia has relatively low rates of e-learning adoption as Cambodia has just started applying e-learning system during the Covid-19 pandemic in early 2020; thus, the advantages of e-learning system are not fully realized and understood. Many schools and universities in Cambodia have applied the e-learning approach in all levels of education since early 2020; however, the use of the e-learning services among students and educators is still facing difficulties. Moreover, certain universities and schools started e-learning systems despite the lack of well-trained educators, computers, internet connection and other necessary facilities for

running e-learning classes; hence universities must utilize their limited resources to full capacities through ICT and connect learners to worldwide virtual learning resources.

There were many theories explaining the acceptance and use of technologies. The researcher has reviewed them and suggested a modified model explaining the intention of undergraduate students to use the e-learning system in three selected universities in Phnom Penh, Cambodia. For this study, the research applied modified UTAUT with an additional construct-self-efficacy in the original UTAUT. First, the model was used to validate relationships between performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention. Second, the model was used to validate the relationship of facilitating conditions and behavioral intention with use behavior of e-learning systems. Data were collected from 500 undergraduate third and fourth year students, learning through e-learning system in the three selected universities in Phnom Penh through a survey questionnaire. Data were analyzed by applying SEM.

The findings showed that performance expectancy, effort expectancy and self-efficacy did not influence behavioral intention to use e-learning systems. On the other hand, social influence and facilitating conditions did significantly influence behavioral intention to use e-learning systems where social influence had the strongest influence on behavioral intention to use e-learning systems. Furthermore, facilitating conditions and behavioral intention had a significant influence on the use behavior of e-learning systems. Based on the findings, social influence was a very important construct influencing behavioral intention and had the strongest influence on behavioral intention to use e-learning system. Therefore, other training institutions or universities or academic staff may see it beneficial to manage social influence that could encourage students or individuals by preparing academic events to share best practices, choosing committed and skilful students in using e-learning system to show to public, provide helpful word-of-mouth and make actions to cope up with any harmful criticism. Moreover, this study also provides theoretical implications for researchers related to adopting technology and also information for training institutions, universities, schools and academic staff on issues they need to focus on when they wish to launch any new system or online services. As far as this research is concerned, it requires further investigations to solve its limitations and the research model weakness. Future researchers should collect data from other students such as graduate students which can make the findings stronger and safer to make any generalization, focus on the impacts of other moderating variables, for example, gender or year of study, and integrate other critical variables such as perceived risk, attitude or personal innovativeness in their future models.

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