Bulletin of Electrical Engineering and Informatics
Vol. 11, No. 3, June 2022, pp. 1471~1479
ISSN: 2302-9285, DOI: 10.11591/eei.v11i3.3768

The predictors of adopting cloud computing e-learning in Iraq: the role of technology readiness

Zainab Dalaf Katheeth[1], Bashar Alathari[2], Ammar Dheyaa Noor[3]
[1]Department of Computer Science, College of Computer Science and Mathematics, Kufa University, Kufa, Iraq
[2]ITRDC, Kufa University, Kufa, Iraq
[3]Department of Computer Science, College of Education, Kufa University, Kufa, Iraq

Article Info

Article history:

Received Apr 16, 2021
Revised Feb 2, 2022
Accepted Apr 21, 2022

Keywords:

Cloud computing e-learning
Perceived usefulness
TAM
TPB

ABSTRACT

Cloud computing electronic learning (CCEL) is a new technology that enables educators and students to extend the storage and access learning materials. The use of this technology is limited worldwide. However, in the time of COVID 19, this technology becomes essential for the educational processes. The purpose of this study is to examine the predictors of using CCEL among academic staff and students in Iraq. Based on literature, this study proposed that perceived ease of use (PEOU), perceived usefulness (PU), and subjective norms (SN) will affect the intention to use (IU) which in turn will affect the actual use (AU). Attitude (AT) is proposed to mediate the relationships while technology readiness (TR) is proposed as a moderator. The data is collected from 331 students and academic staff in three Iraqi universities using stratified sampling. Data analysis is conducted using SmartPLS. The results showed that PEOU, PU, and SN affect positively IU which in turn affected AU. AT mediated partially the effect of PEOU, PU, and SN on IU while TR moderated only the effect of PEOU on IU. Decision makers are recommended to simplify the usage of CCEL and to conduct workshops about the usage and benefits of CCEL.

Corresponding Author:

Zainab Dalaf Katheeth
Department of Computer Science, College of Computer Science and Mathematics
Kufa University, Iraq
Email: zainab.alfarawn@uokufa.edu.iq

1. INTRODUCTION

Education is important for all nations and governments. The introduction of web 2.0 application has changed the way of education and teaching as well as learning [1]. One of the technologies of web 2.0 is the cloud computing (CC). CC has massively impacted the electronic learning (e-learning) as well as the use of technology in education [2]. In the current environment, universities and schools are recommended or enforced to move to online education [3]. The use of traditional e-learning is not sufficient to meet the move and there is a need to include the technology of CC for massive storage and security as well as availability reasons [4].

E-learning refers to the action of teaching and learning in an online environment. This method of learning dominated the learning during the last decade. However, with the need to move online due to the COVID 19 and its implications and effects on the educational processes and procedures, the need arise to use more capable technology such as CC. CC has been introduced in the last decade and it provides a digital framework to increase the information storage capabilities [5]. The application of CC is widely known in developed countries. However, in developing countries that were affected by the consequence of COVID 19 such as Iraq, the application of cloud and e-learning is not known, and more studies are needed in this regard.

However, generally in the middle east, the adoption of technology by students is low at 20-25% and there is a huge gap in the usage of technology between developed and developing countries [6]–[8].

Iraq is a developing country with high oil production capabilities. However, due to instability, the infrastructure in the country is still under development and technological readiness which includes the financial readiness, and the infrastructure readiness is significant factor in the move to cloud computing e-learning (CCEL). Recently, schools and universities were suggested to use distance learning. In this process, the country needs to understand the predictors that encourage students and academic staff to use the technology. In term of assessing the usage of new technology, previous studies are in agreement that the literature focused on the technical factors while the behavioral approach received comparatively less attention [9]. Another issue in the literature is the focus on the adoption of CC by business organization. Further, prior literature utilized the users such as students and academic staff in investigating the adoption [9].

Among the behavioral theoretical adoption theory, the technology acceptance model (TAM) [10] is widely used to assess the adoption of new technology and it is the most usefulness model in e-learning [11]. Since the technology of CCEL is a new in the context of Iraqi students and academic staff, the subjective norms (SN) of the community are critical for such move. Further, a contextual factor that is important for the adoption in Iraqi environment is the technological readiness (TR). Consequently, this study aims to examine the predictors of CCEL adoption among students and academic staff in Iraqi universities. The study deploys the TAM model as well as the SN from the theory of planned behavior (TPB). Further, the study also deploys TR as a moderating variable. Next sections elaborate on the prior literature of theoretical framework, and prior studies as well the methods, the data analysis and findings, discussion and implication, as well as the conclusion.

2. LITERATURE REVIEW AND FRAMEWORK DEVELOPMENT

In the following sub-section, the theoretical framework mainly TAM and TPB as well as the CCEL and the framework of this study are discussed.

2.1. Theoretical framework

There are several adoption theories. However, TAM is the most widely used model in this context. TAM basically related the adoption of a new technology to perceived ease of use (PEOU), perceived usefulness (PU), and attention (AT). The model also linked the behavioural intention (BI) to the use behaviour (UB). However, studies criticized TAM for its explanatory power. A study by Venkatesh *et al.* [12] pointed out that TAM can explain 54% of the variation in technology adoption. To strengthen the explanatory power, other contextual factors can be added. TPB by Ajzen [13] pointed out that the adoption of a technology can be related to SN, which is the effect of others on the decision of individual to adopt a new system or technology. SN is important for the individual and can alter his or her behaviour and AT toward the technology. A combination between TAM and TPB is expected to explain the adoption of CCEL.

2.2. Cloud computing e-learning

CCEL is a technology that has been used recently to support the learning and teaching in virtual universities. Recently, the technology has become the new reality as most of countries are shifting to online learning. Such move requires high capabilities of storing, accessing, and investment in the infrastructure to increase the readiness of educational institution to use the technology. Challenges are existed in developing countries to speed the process of using technology such as CCEL [14]. The need to use technology by universities is more severe currently due to several reasons. Recently, the outbreak of COVID 19 has severe consequences on all businesses and universities are no exception. Using CC in educational learning and teaching is a solution that can enable the access of educational material from anywhere at any time [15]. Against this background, the use of CCEL is still limited not only in the developing countries but also worldwide and there is a need for more studies to discover the intention of users and the reasons that lead them to use the technology [16], [17].

2.3. Hypotheses development

This section disucsses the hypotheses development of this study. Based on TAM and TPB as well as the review of the literature, the hypotheses are developed and discussed in the next subsections.

2.3.1. PEOU and intention to use

PEOU is defined as "the extent to which a person believes that using a system would be free of mental efforts" [10]. PEOU is important for the intention to use (IU) of a technology. Low physical and mental effort to use a system is perceived as a positive indicator to adopt the system. Previous studies found that PEOU is important and can affect the CCEL [18]. It can enhance the IU of the CCEL technology and lead students to

use the technology [19]. PEOU also affects positively the usage of CC by Liberians and information specialist [20]. In this study, it is expected that students and academic staff who perceive the CCEL as ease to use will have positive intention. Therefore, it is hypothesized:

H1: PEOU affects positively IU of CCEL

2.3.2. PU and IU

PU is defined as "the extent to which a person believes that using a system would enhance his or her job performance" [10]. PU of the CCEL in term of accessing and using the course and delivering or attending the lecture is important for users of the technology. Several previous studies found that PU has a significant effect on the IU of CCEL [18], [19]. PU affected positively the continuous use of CCEL [3], and the adoption of e-learning [21]. Accordingly, in this study, it is expected that the PU will have a positive impact on the IU of CCEL. Therefore, it is hypothesized:

H2: PU affects positively the IU of CCEL

2.3.3. SN and IU

SN is defined as "a reflection of an individual's perception of social pressures to perform or not to perform the behaviour" [13]. Social pressure of others on the decision of individuals is critical for adopting a new technology. In the study of [22], the social influence which is equal to SN found to have a significant effect on the adoption of the technology. Similarly, other previous studies found that SN is a critical factors for using a technology such as CCEL [23]–[25]. Therefore, it is anticipated that SN will have a positive effect on the IU of CCEL among students and academic staff in Iraq. Accordingly, it is hypothesized:

H3: SN affects positively the IU of CCEL.

2.3.4. IU and AU of CCEL

TAM model proposed that the intention to use affect the actual use of the system" [10]. Other theories such as the UTAUT as well as the TPB proposed that IU will have a positive effect on AU [13]. Thus, it is expected that IU will have a positive effect on AU.

H4: IU affects positively the AU of CCEL.

2.3.5. Attitude as a mediator

The original TAM model proposed that attitude can mediate the effect of usefulness on the BI. The study of [26] pointed out the importance of AT as a mediating variable and suggested that researchers should focus on mediating variables such as AT to better understand the adoption of technology. Several researchers have tested this mediating effect. For example, Šumak *et al.* [27] tested the mediating effect of attitude between PEOU and PU and the IU to use e-learning technology. The finding indicated that AT can play a mediating role. The study of Huang [28] investigated the factors that affect students to continuously use CC. The finding showed that AT has mediating role between the variables. AT mediated the effect of technology and social factors on the continues. The study of Taufiq-Hail *et al.* [29] examined the mediating role of AT between SN and IU to adopt green CC by individual in Malaysian universities and found that AT fully mediated the effect of SN on IU. The study of Dai [30] investigated the adoption of CC services by customers and found that AT mediated the effect of PEOU, PU, and perceived enjoyment on the adoption of CC services. In this study, the AT is proposed as a mediating variable in the relationship between PEOU, PU, and SN with IU of CCEL.

H5: AT mediates the effect of PEOU on the IU of CCEL.

H6: AT mediates the effect of PU on the IU of CCEL.

H7: AT mediates the effect of SN on the IU of CCEL.

2.3.6. Technology readiness as a moderator

TR refers to "how organizational users are prepared and willing to adopt a new technology based on the perceived features of the technology" [31]. The study of Senyo *et al.* [32] investigated the adoption of cloud in developing countries and found that TR has essential effect on the adoption of technology in developing countries. The study of Yang *et al.* [31] also investigated the readiness of adopting cloud and found that the technological, environmental, and organizational readiness are important for the adoption of technology. In term of the moderating effect of TR, the findings of the study of [22] indicated that TR has moderated the effect of performance expectancy and social influence on the IU to use CC while TR did not moderate the effect of PEOU and facilitating condition on the IU. In this study, the TR is expected to moderate the effect of PEOU, PU and SN on the IU:

H8: TR moderates the effect of PEOU on the IU of CCEL.

H9: TR moderates the effect of PU on the IU of CCEL.

H10: TR moderates the effect of SN on the IU of CCEL.

3. RESEARCH METHOD

Based on TAM and TPB and the hypothesies, the framework of this study is proposed and given in Figure 1. This study is quantitative. The population of this study is three universities in Iraq. These universities are the University of Kufa, University of Karbala, and University of Basrah. These three universities are selected due to the notion that the three universities are implementing the distance learning. Based on the website of the universities, the number of the academic staff is equal to 4,921 while the number of students is 48,312. However, the number of academic staff is comparatively lower than the students. Thus, to better represent the population, the stratified random sampling technique is used. Accordingly, based on the sampling formula provided by [33], the sample size for the population (53,233) of this study is 381. Since the stratified sampling is used in this study, the sample size for academic staff is 36 (9.5%*381=36) and the sample size for students is (91.5%*381=345) 345.

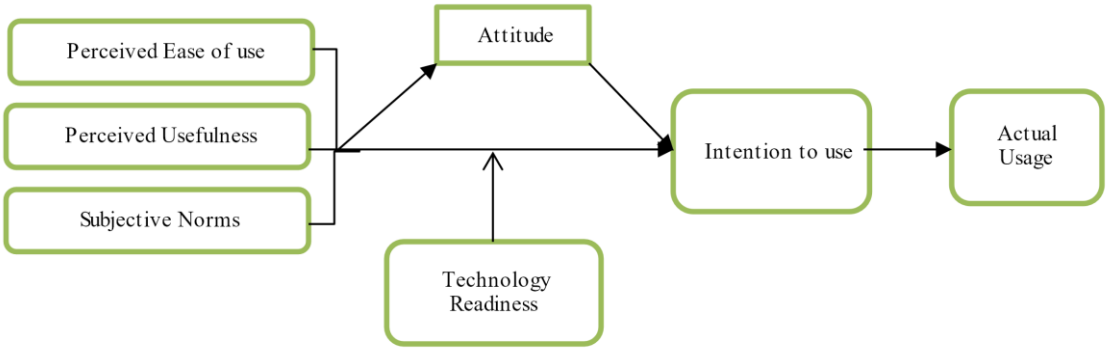

Figure 1. Conceptual framework

Data was collected from the respondents. A review of prior literature was utilized to find the measurement of this study. Measurement of the PEOU (4 items), PU (4 items) and AT (4 items), IU (5 items) and AU (6 items) were adopted from [10]. Subjective norms was adopted from [13]. Technology readiness was adopted from [34]. The questionnaire was translated into Arabic and validated by three experts in the field of technology adoption. A pilot study using 38 respondents was conducted to assess the reliability of the measurement. All the measurements are reliable with Cronbach's Alpha greater than 0.70 as suggested by [35]. A total of 331 responses were collected. Previous studies used similar amount of responses to analyze the data using SmartPLS [36]–[39]. The response also meets the role of thumb as suggested by [40].

4. FINDINGS

This section deals with the data analysis. Mainly, this section discusses the data screening, profile of the respondents, and analysis of SmartPLS.

4.1. Profile of respondents and data screening

A total of 319 respondents have participated in this study. Majority of the respondents (60.8%) are in the age between 18-28 years, and they are males (74.0%) in the undergraduate stage of study (77.1%) with experience of using the internet of more than three years and less than seven years (83.7%). The data was examined for missing value, outliers and multicollinearity. The collected data is 331 and 12 responses were excluded on the ground of missing value and outliers. No collinarity or not normal data were observed.

4.2. Measurement model

Lowry and Gaskin [40] pointed out that researchers can assess the measurement model by checking the factor loading (FL), reliabilities and validities. In this study, the FL for all the variables is greater than 0.70 except for item SN2 form subjective norms, IU1 from intention to use, PEOU3 from perceived ease of use, and TR2 from technology readiness. In term of the cronbach's alpha (CA), and composite reliabilities (CR), both reliabilities are greater than 0.70. the average variance extracted (AVE) for all the variables is greater than 0.50 confirning the achievement of convergent validity. Similarly, the discriminant validity was also confirmed in this paper. Table 1 shows the reliabilities and validities of the measurement model.

Table 1. Reliabilities and validities of the measurement model

	CA	CR	AVE	PEOU	PU	SN	AT	TR	IU	AU
PEOU	0.918	0.938	0.752	0.867						
PU	0.941	0.955	0.809	0.301	0.900					
SN	0.923	0.942	0.765	0.201	0.317	0.875				
AT	0.960	0.966	0.782	0.505	0.294	0.317	0.884			
TR	0.962	0.968	0.789	0.454	0.354	0.349	0.362	0.888		
IU	0.959	0.963	0.670	0.695	0.391	0.231	0.273	0.220	0.818	
AU	0.942	0.954	0.775	0.398	0.490	0.334	0.353	0.361	0.324	0.880

4.3. Structural model

In assessing the structural model, r-square (R^2), Q-square, (Q^2), effect size (f^2), and path coefficient are important to be evaluated [41]. The value of r-square ranged between 0.25-0.75. Value of Q^2 should be greater than zero and it is obtained by conducting blindfolding analysis. Acceptable value of f^2 is greater than 0.02 [41]. The direct effect structural model, mediating model and the moderating model were examined. Figure 2 shows the moderating effect of TR. The results of all the hypotheses are discussed in the next sections.

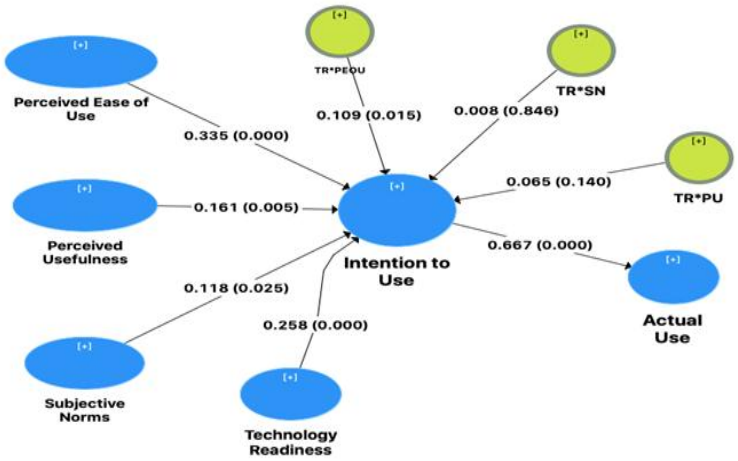

Figure 2. Moderating effect of technology readiness

4.4. Hypotheses testing

The hypotheses of this study were testing using the structural model. Direct, mediating, and moderating hypotheses were tested. Table 1 shows that 64.7% of the variation in IU can be explained by PEOU, PU, and SN. In the mediating model, the R^2 increased to 66.6% and 69.3% in the moderating effect of TR. All the effect size (f^2) are acceptable except for those that are less than 0.02. For the Q^2 or the predictive relevance, they are acceptable because they are greater than zero. These indicators indicate that the criteria to evaluate the structural model are acceptable based on the suggestion of [42]. Result of the hypotheses testing are given in Table 1.

Table 1. Results of hypotheses testing

H	Path	β	STDEV	T Values	P Values	f2	R2	Q2	Remark
			Direct effect hypotheses						
H1	PEOU -> IU	0.403	0.077	5.237	0.00	0.18	.647	0.521	Supported
H2	PU -> IU	0.279	0.074	3.752	0.00	0.09			Supported
H3	SN -> IU	0.210	0.059	3.554	0.00	0.05			Supported
H4	IU -> AU	0.668	0.044	15.178	0.00	0.80			Supported
			Mediating role of attitude						
H5	PEOU -> AT -> IU	0.071	0.031	2.259	0.024	0.11	.666	0.443	Supported
H6	PU -> AT -> IU	0.083	0.028	2.926	0.003	0.04			Supported
H7	SN -> AT -> IU	0.089	0.028	3.178	0.001	0.02			Supported
			Moderating effect of technology readiness						
H8	TR*PEOU -> IU	0.109	0.046	2.362	0.018	0.03	.693	0.501	Supported
H9	TR*PU -> IU	0.065	0.045	1.440	0.150	0.01			Rejected
H10	TR*SN -> IU	0.008	0.041	0.195	0.846	0.00			Rejected
	TR -> IU	0.258	0.072	3.581	0.000	0.07			Supported

4.4.1. Direct effect hypotheses

The direct effect hypotheses are tested in Table 1. The first hypothesis proposed that the PEOU will have a direct positive effect on IU. The findings showed that the effect is positive and significant (β=0.403, t-value=5.237, P-value=0.00). Thus, PEOU is significant predictors of IU of CCEL usage. Thus, H1 is supported. The findings also showed that the effect of PU is a significant predictor of IU (β=0.279, t-value=3.752, P-value=0.00). Thus, H2 is supported. For the effect of SN on IU, the findings showed that SN is a significant predictor of IU of CCEL (β= 0.210, t-value=3.554, P-value=0.00). Thus, H3 is supported. For H4, the effect of IU on AU is positive and significant (β= 0.668, t-value=15.178, P-value=0.00). Thus, H4 is supported as shown in Table 1.

4.4.2. Mediating role of attitude

The mediating role of AT is examined based on the suggestion of [42]. It is examined by comparing the direct and the indirect effect of the hypotheses. The direct effect as shown in H1, H2, H3 are significant. The mediating effect is confirmed because the direct effect is reduced after including the mediator (AT) and the indirect effect as shown in Table 1 are significant. For H5, the AT mediated the effect of PEOU on IU (PEOU -> AT -> IU). Therefore, H5 is supported. For the H6, AT also mediated the effect of PU on IU (PU -> AT -> IU). Thus, H6 is supported. In term of SN, the effect of SN is mediated by AT (SN -> AT -> IU). Thus, AT mediated the effect of PEOU, PU and SN on the IU. According, H5, H6, and H7 are supported. However, since the direct and the indirect effect are significant, AT is a partial mediator.

4.4.3. Moderating role of technology readiness

According to Hair *et al.* [42] the moderator can be tested by multiplying the indicators of the independent variable with the indicator of the moderator to create the moderating effect. In this study, three moderating effects were created and tested. The findings in Table 1 shows that the moderating effect of TR between PEOU and IU (TR*PEOU -> IU) is positive and significant (β=0.109, t-value=2.362, P-value=0.018). Thus, H8 is supported. The two-way interaction effect of TR between PEOU and IU is given in Figure 3, it shows that there is interaction. The high TR is above the low TR indicating that the interaction is positive.

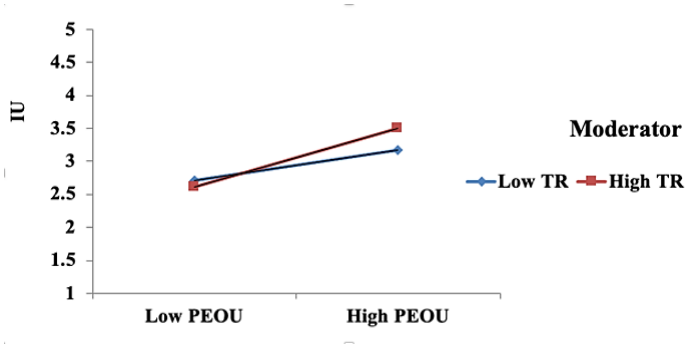

Figure 3. Two-way interaction

For H9, TR did not moderate the effect of PU on IU. Table 1 shows that the interaction effect (TR*PU -> IU) is not significant (β=0.065, t-value=1.440, P-value=0.150). Thus, H9 is rejected. For H10, the moderating effect of TR between SN and IU (TR*SN -> IU) is also not significant (β= 0.009, t-value=.195, P-value=0.846). Thus, H10 is rejected. However, the impact of TR on IU is confirmed (β=0.258, t-value=3.581, P-value=0.00).

5. DISCUSSION AND IMPLICATIONS

The findings of this study showed that PEOU followed by PU and SN. The ease of using CCEL by students and academic staff is important to use the system. Universities are advised to conduct workshops to educate the users about the CCEL. PU is also important and decision makers in Iraqi are advised to educate the users about the benefits that can be gained from using the technology. SN is important and the increase in the users will have important effect on the potential users of CCEL because they will spread a positive word of mouth about the system and affect the behavior of non-users. Experts and academic staff who are aware about the use of CC can be deployed to enlighten the users about the CCEL. The effect of IU on AU is also significant. Thus, the positive IU will lead eventually to the use of CCEL [18]-[20].

In term of the AT as a mediator, the findings showed that AT mediated the effect of PEOU, PU and SN on the IU. AT toward the CCEL is important and the decision makers in Iraq are advised to encourage the spread of the technology among the universities so that the positive AT can lead to more usage of the technology among users. This findings is in line with previous studies that found that AT is a mediating variable [28]-[30] and it is in line with the TAM model. In term of the TR, it moderated the effect of PEOU on IU only while did not moderate the effect of PU and SN on IU. The positive moderating effect of TR in the relationship between PEOU and IU could be due to the notion that high TR ease the use of CCEL. When the infrastructure is ready and the internet connection is available, the perception of PEOU will increase and its relationship with IU will improve. The moderating effect is in line with the study of [22] who found that TR moderated the effect of performance expectancy but did not moderate the effect of social influence and effort expectancy. The finding also showed that TR is an important predictor of IU. This is also in line with the findings of [32] and [31]. The study has contributed to the literature of CCEL in developing countries. The use of TAM is valid in the context of CCEL. The study also contributed to the literature by examining the mediating role of AT. In addition, a contribution has been made in term of testing the moderating role of TR. As practical implications, the decision makers are advised to encourage the use of CCEL among users and to focus on the PEOU.

6. CONCLUSION

This paper was conducted to determine the predictors of using CCEL among academic staff and students in Iraqi universities. This study was conducted on three universities using stratified random sampling. Thus, the findings can be generalized on the three universities. The data was collected from academic staff and students. Thus, the findings are based on their perceptions. The TAM model was deployed with additional contextual factors. As a way for future work, future studies are advised to examine the predictors among either academic staff or students using random sampling. Further studies are also advised to include more universities to enhance the generalization of the findings. Additional variables are recommended for future studies. This includes the trust, security, and privacy of the users. Future studies are also advised to deploy other theoretical model such as UTAUT or to combine more than one theory to explain the variation in IU.

The study has filled the gaps in the literature and managed to explain significant percent of the variation in IU toward using CCEL. The findings can be used by the decision makers in Iraq to enhance the usage of CCEL. The decision makers are advised to enhance the perception about CCEL and to educate the users about the usage and the benefits that can be gained from using the CCEL.

REFERENCES

[1] N. Ranjan and R. K. Dhanraj, "E-Learning via Cloud Computing," *Artif. Comput. Intell.*, vol. 1, no. June, 2020. https://acors.org/ijacoi/VOL1_ISSUE3_16.pdf

[2] J. H. Chang, P. S. Chiu, and C. F. Lai, "Implementation and evaluation of cloud-based e-learning in agricultural course," *Interact. Learn. Environ.*, vol. 0, no. 0, pp. 1–16, 2020, doi: 10.1080/10494820.2020.1815217.

[3] Y. M. Cheng, "Students' satisfaction and continuance intention of the cloud-based e-learning system: roles of interactivity and course quality factors," *Educ. Train.*, 2020, doi: 10.1108/ET-10-2019-0245.

[4] A. Al-Abri, Y. Jamoussi, N. Kraiem, and Z. Al-Khanjari, "Comprehensive classification of collaboration approaches in E-learning," *Telemat. Informatics*, vol. 34, no. 6, pp. 878–893, 2017, doi: 10.1016/j.tele.2016.08.006.

[5] D. Dempsey and F. Kelliher, *Industry Trends in Cloud Computing*. Palgrave Macmillan, Cham, 2018, doi: 10.1007/978-3-319-63994-9.

[6] A. Tarhini, K. Hone, and X. Liu, "A cross-cultural examination of the impact of social, organisational and individual factors on educational technology acceptance between British and Lebanese university students," *Br. J. Educ. Technol.*, vol. 46, no. 4, pp. 739–755, 2015, doi: 10.1111/bjet.12169.

[7] A. Tarhini, M. J. Scott, S. K. Sharma, and M. S. Abbasi, "Differences in intention to use educational RSS feeds between lebanese and British students: A multi-group analysis based on the technology acceptance model," *Electron. J. e-Learning*, vol. 13, no. 1, pp. 14–29, 2015.

[8] N. Salleh, M. S. I. Abdullahi, A. Nordin, and A. A. Alwan, "Cloud-Based Learning System for Improving Students' programming Skills and Self-Efficacy," *J. Inf. Commun. Technol.*, vol. 17, no. 4, pp. 629–651, 2018, doi: 10.32890/jict2018.17.4.6.

[9] M. Kayali, N. Safie, and M. Mukhtar, "The Effect of Individual Factors Mediated by Trust and Moderated by IT Knowledge on Students ' Adoption of Cloud Based E -learning," *Int. J. Innov. Technol. Explor. Eng.*, vol. 9, no. 2, 2019, doi: 10.35940/ijitee.J1137.129219.

[10] F. D. Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *Source MIS Q.*, vol. 13, no. 3, pp. 319–340, 1989, doi: 10.2307/249008.

[11] P. K. Senyo, E. Addae, and R. Boateng, "Cloud computing research: A review of research themes, frameworks, methods and future research directions," *Int. J. Inf. Manage.*, vol. 38, no. 1, pp. 128–139, 2018, doi: https://doi.org/10.1016/j.ijinfomgt.2017.07.007.

[12] V. Venkatesh, M. Morris, G. Davis, and F. Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Q.*, vol. 27, no. 3, pp. 425–478, 2003, doi: 10.2307/30036540.

[13] I. Ajzen, "The theory of planned behavior," *Organ. Behav. Hum. Decis. Process.*, vol. 50, no. 2, pp. 179-211, Dec. 1991, doi: 10.1016/0749-5978(91)90020-T.

[14] O. K. J. Mohammad, "Recent Trends of Cloud Computing Applications and Services in Medical, Educational, Financial, Library and Agricultural Disciplines," in *Proceedings of the 4th International Conference on Frontiers of Educational Technologies*, 2018, pp. 132–141, doi: 10.1145/3233347.3233388.

[15] S. Singh and D. Chand, "[SiCh14] Trust evaluation in cloud based on friends and third party's recommendations," *2014 Recent Adv. Eng. Comput. Sci.*, pp. 1–6, 2014, doi: 10.1109/RAECS.2014.6799600.
[16] T. D. Nguyen, T. M. Nguyen, Q. T. Pham, and S. Misra, "Acceptance and use of E-learning based on cloud computing: The role of consumer innovativeness," in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, vol. 8583 LNCS, no. PART 5, 2014, pp. 159–174, doi: 10.1007/978-3-319-09156-3_12.
[17] T. Nguyen, D. Nguyen, and T. Cao, "Acceptance and use of information system: E-learning based on cloud computing in Vietnam," *Inf. Commun. Technol.*, no. 4960, pp. 139–149, 2014, doi: 10.1007/978-3-642-55032-4_14.
[18] L. Y. K. Wang, S. L. Lew, S. H. Lau, and M. C. Leow, "Usability factors predicting continuance of intention to use cloud e-learning application," *Heliyon*, vol. 5, no. 6, p. e01788, 2019, doi: 10.1016/j.heliyon.2019.e01788.
[19] L. A. Hussein and M. F. Hilmi, "Cloud Computing Based E-learning in Malaysian universities," *Int. J. Emerg. Technol. Learn.*, vol. 15, no. 8, pp. 4–21, 2020, doi: 10.3991/ijet.v15i08.11798.
[20] N. Aharony, "An exploratory study on factors affecting the adoption of cloud computing by information professionals," *Electron. Libr.*, vol. 33, no. 2, pp. 308–323, 2015, doi: 10.1108/EL-09-2013-0163.
[21] S. S. Al-Gahtani, "Empirical investigation of e-learning acceptance and assimilation: A structural equation model," *Appl. Comput. Informatics*, vol. 12, no. 1, pp. 27–50, 2014, doi: 10.1016/j.aci.2014.09.001.
[22] M. Tsourela and M. Roumeliotis, "The moderating role of technology readiness, gender, and sex in consumer acceptance and actual use of Technology-based services," *J. High Technol. Manag. Res.*, vol. 26, no. 2, pp. 124–136, 2015, doi: 10.1016/j.hitech.2015.09.003.
[23] Z. Asadi, M. Abdekhoda, and H. Nadrian, "Cloud computing services adoption among higher education faculties: development of a standardized questionnaire," *Educ. Inf. Technol.*, vol. 25, no. 1, pp. 175–191, 2020, doi: 10.1007/s10639-019-09932-0.
[24] W.-L. Shiau and P. Y. K. Chau, "Understanding behavioral intention to use a cloud computing classroom: A multiple model comparison approach," *Inf. Manag.*, vol. 53, no. 3, pp. 355–365, 2016, doi: 10.1016/j.im.2015.10.004.
[25] Z. Asadi, M. Abdekhoda, and H. Nadrian, "Understanding and predicting teachers' intention to use cloud computing in smart education," *Interact. Technol. Smart Educ.*, 2019, doi: 10.1108/ITSE-05-2019-0019.
[26] S. Verma, S. S. Bhattacharyya, and S. Kumar, "An extension of the technology acceptance model in the big data analytics system implementation environment," *Inf. Process. Manag.*, no. January 2017, pp. 0–1, 2018, doi: 10.1016/j.ipm.2018.01.004.
[27] B. Šumak, M. Heričko, M. Pušnik and G. Polančič, "Factors affecting acceptance and use of moodle: An empirical study based on TAM," *Inform.*, vol. 35, no. 1, pp. 91–100, 2011.
[28] Y. M. Huang, "The factors that predispose students to continuously use cloud services: Social and technological perspectives," *Comput. Educ.*, vol. 97, pp. 86–96, 2016, doi: 10.1016/j.compedu.2016.02.016.
[29] G. A. Taufiq-Hail, H. Ibrahim and S. A. M. Yusof, "Attitude's mediating effect on intention to use Saas cloud computing services as a means of green IT: Malaysian university setting," *J. Inf. Syst. Technol. Manag.*, vol. 2, no. 4, pp. 35–51, 2017.
[30] B. Dai, "Consumer Adoption of Cloud Computing Service: An Exploratory Study," in *Thriving in a New World Economy*, Springer, 2016, pp. 381–384, doi: 10.1007/978-3-319-24148-7_114.
[31] Z. Yang, J. Sun, Y. Zhang, and Y. Wang, "Understanding SaaS adoption from the perspective of organizational users: A tripod readiness model," *Comput. Human Behav.*, vol. 45, pp. 254–264, 2015, doi: 10.1016/j.chb.2014.12.022.
[32] P. K. Senyo, J. Effah, and E. Addae "Preliminary insight into cloud computing adoption in a developing country," *J. Enterp. Inf. Manag.*, vol. 29, no. 4, 2016, doi: 10.1108/JEIM-09-2014-0094.
[33] R. V. Krejcie and D. W. Morgan, "Determining Sample Size For Research Activities, Educational And Psychological Measurement," *Educ. Psychol. Meas.*, no. 30, pp. 607–610, 1970, doi: 10.1177%2F001316447003000308.
[34] H. Gangwar, H. Date, and R. Ramaswamy, "Understanding determinants of cloud computing adoption using an integrated TAM-TOE model," *J. Enterp. Inf. Manag.*, vol. 28, no. 1, pp. 107–130, 2015, doi: 10.1108/JEIM-08-2013-0065.
[35] U. Sekaran and R. Bougie, *Research methods for business: A skill building approach*. John Wiley & Sons, 2016.
[36] S. Alaarj, Z. A. Mohamed and U. S. A. Bustamam, "The Effect of Knowledge Management Capabilities on Performance of Companies : A Study of Service Sector," *Int. J. Econ. Res.*, vol. 14, no. 15, pp. 457–470, 2017.
[37] S. Alaarj, Z. A. Mohamed and U. S. A. Bustamam, "Do Knowledge Management Capabilities Reduce the Negative effect of Environment Uncertainties on Organizational Performance? A Study of Public Listed Companies in Malaysia," *Int. J. Econ. Res.*, vol. 14, no. 15, pp. 443–456, 2017.
[38] S. Alaaraj, Z. A. Mohamed, and U. S. A. Bustamam, "External Growth Strategies and Organizational Performance in Emerging Markets: The Mediating Role of Inter-Organizational Trust," *Rev. Int. Bus. Strateg.*, vol. 28, no. 2, pp. 206–222, 2018, doi: 10.1108/RIBS-09-2017-0079.
[39] S. Alaarj, Z. Abidin-Mohamed, and U. S. B. A. Bustamam, "Mediating Role of Trust on the Effects of Knowledge Management Capabilities on Organizational Performance," *Procedia - Soc. Behav. Sci.*, vol. 235, pp. 729–738, Nov. 2016, doi: 10.1016/j.sbspro.2016.11.074.
[40] P. B. Lowry and J. Gaskin, "Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it," *IEEE Trans. Prof. Commun.*, vol. 57, no. 2, pp. 123–146, 2014, doi: 10.1109/TPC.2014.2312452.
[41] J. F. Hair Jr, M. Sarstedt, L. Hopkins, and V. G. Kuppelwieser, "Partial least squares structural equation modeling (PLS-SEM)," *Eur. Bus. Rev.*, vol. 26, no. 2, pp. 106–121, 2014, doi: 10.1108/EBR-10-2013-0128.

BIOGRAPHIES OF AUTHORS

Zainab Dalaf Katheeth is a lecturer and researcher at the Department of Computer Science, Faculty of Computer Science and Mathematics, University of Kufa (UOK), Najaf, Iraq. She graduated from the Computer Engineering and information from the University of Mosul for the year 2006 and holds a master's degree in computer engineering from the University of India, MRIU. She can be contacted at email: zainab.alfarawn@uokufa.edu.iq.

Bashar Alathari received a M.Sc. degree in software engineering from University of UTHM in 2015 from Malaysia. He is working lecture and Researcher in university of kufa, ITRDC. Among his research interests are research in software engineering and networking. He can be contacted at email: bashar.alathari@uokufa.edu.iq.

Ammar Dheyaa Noor from Baghdad, Iraq and he was born in 1985. He obtained his bachelor degree from Alqadisia University in computer science from 2003-2007. He obtained his master degree from uniten University in information technology from malasyia 2013-2015 He has been working as a lectuerer in enginering college, Kufa Univesrity from 2007-2017. And from 2017 until now in educatetnal college computer scince department. He can be contacted at email: ammard.alethari@uokufa.edu.iq.