EXPLORING CLOUD COMPUTING ADOPTION IN HIGHER EDUCATIONAL ENVIRONMENT: AN EXTENSION OF THE TPB MODEL WITH TRUST, PEER INFLUENCES, PERCEIVED USEFULNESS AND EASE OF USE

Waleed Al-Ghaith

Imam Mohammad Ibn Saud Islamic University (IMSIU)

ABSTRACT

Cloud computing is regarded as the next generation of computing. It is progressively being used as a launching pad for digital innovation and organizational agility. Cloud computing is frequently used by private and public organizations due to its flexibility, collaboration, cost-effectiveness, and scalability. These characteristics make cloud computing indispensable for individuals and businesses such as higher education institutes. Several prior studies covered the technological facets of cloud-based contexts, including cloud security, scalability, and virtualization. However, it is contend that the main barrier to cloud computing isn't technical but cognitive or behavioural, and in particular attitudinal. Thus, this research aims to study higher education' students' attitudes and their intention to adopt cloud computing, with a specific concentration on the effect of trust, peer influences, perceived usefulness and ease of use in order to investigate the factors influencing the adoption of cloud computing in higher educational environment in Saudi Arabia. This study presents an extended Decomposed Theory of Planned Behaviour (DTPB) to include trust, peer influences, perceived usefulness and ease of use as a cognition, representing a person's perception of social influence to perform or not perform a behaviour under consideration. The proposed model was able to explain 62% of the variance in behavioural intention and 65% of students' attitudes towards the adoption of cloud computing in higher educational environment. The study's findings show that the proposed model explained a significant amount of variation in cloud computing adoption. It suggests that the model expansion by incorporating trust, peer influences, perceived usefulness and ease of use factors were valuable explorations. Further, the findings demonstrate that university students' attitudes toward using cloud computing are significantly influenced by perceived ease of use, trust in cloud computing service provider and perceived usefulness, which have the ability to explain their attitude by 22.15%, 21.9% and 20.9% respectively. The result also shows that "subjective norm" alone explains 33.95% of students' "behavioural intentions" towards using cloud computing, followed by their "attitude," which explains around 14.24% of "behavioural intentions," and then university students' "self-efficacy," with 13.71%..

KEYWORDS

Cloud Computing, DTPB, Trust, Technology Acceptance, Peer influences, Perceived usefulness, Perceived ease of use.

1. INTRODUCTION

Emerging innovations in cloud computing have piqued the interest of IT professionals across the world. Cloud computing is an advanced form of distributed networking that enables the sharing of hardware and software assets among various public and private sectors and businesses [1]. The notion of "cloud computing" means the hardware and systems that are used to provide services, as well as the applications that are created and distributed via the Internet [2].

Cloud computing is regarded as the next generation of computing. It is progressively being used as a launching pad for digital innovation and organizational agility. Cloud computing is frequently used by private and public firms due to its cost-effectiveness, scalability, collaboration and flexibility. These characteristics make cloud computing indispensable for individuals and businesses such as higher education institutes. Research and Markets [3] reported that the global Cloud Computing in Higher Education market was worth more than us$ 2,182.4 million in 2020 and is expected to grow to USD 8,779.1 million by 2027. Cloud computing has emerged as a crucial technology in the modern era, and it is now designated the fifth utility following the four fundamental utilities, namely, electricity, water, gas, and telecommunication [4], [5].

Higher education institutions are experiencing difficulties with the recruitment of participants, the demand for IT, the quality of education services, and affordability [6]; [7]; [5]. Thus, higher education institutions work diligently to manage resources and offer better services [8]; [9]. Higher education institutions represented by educators and students have found the benefits offered by cloud computing, such as cost reduction, educational sustainability, and raising educational quality, an opportunity to achieve their goals [10]; [11]; [12]. The adoption of cloud computing in higher education institutions is gaining ground, but it is still considered to lag behind the commercial sector and even government organizations in this market [13]. Yet, it is increasingly becoming a necessary element of higher education institutions' offerings rather than an option, which has boosted competitiveness in the higher education market [14]. However, despite its numerous benefits, cloud computing still faces significant barriers among university students to adopt it. Many students are comfortable with traditional methods of storing data, such as USB drives or hard disks. They may also be skeptical about relying on third-party providers for their data storage needs.

A number of earlier studies covered the technological facets of cloud contexts, including cloud scalability, virtualization, and security [15]; [16]. However, it is contend that the most significant barrier to cloud computing is not technical but rather cognitive or behavioural, particularly attitudinal [17]; [18]. Thus, this research aims to study university students' students' attitudes and their intention to adopt cloud computing, in order to investigate the factors influencing the adoption of cloud computing among higher education students in Saudi Arabia. This study develops a conceptual model based on the Theory of Planned Behaviour (TPB) that lends itself to investigating these factors. Moreover, this study extends TPB to investigate drivers of cloud adoption among higher education students in Saudi Arabia by placing peer influences, perceived usefulness, ease of use, and "trust" of cloud computing providers as new constructs within the TPB model. A quantity of research has recognized and anticipated the importance of "trust" in cloud computing providers, perceived ease of use, perceived usefulness and peer influences in cloud computing settings, but merely scarce scholars have investigated the impact these factors have on attitudes and behavioural intentions toward cloud computing usage. The study's objective is to further comprehend higher education students' attitudes toward cloud computing.

This research will participate to the body of extant literature by elucidating the "trust" role in cloud computing providers, perceived ease of use, perceived usefulness and peer influences in cloud adoption behaviour. Additionally, it will validate whether the TPB is a reliable model based on its ability to explain higher education students' attitudes and intents in the cloud environment. This begs the following research question: what factors affect higher education students' attitudes and their intention to adopt cloud computing? The rest of this paper addresses this question by presenting and extending the TPB as a potential theory for explaining differences in adoption behaviour. This paper is organized as follows: the following section presents relevant earlier studies on cloud computing and the study's theoretical framework, which includes the TPB as the main theory that guides the development of the study model. The third section discusses the development of research hypotheses and the study model. The fourth section describes the study methodology, including its measurements and applied data collection procedures. The fifth section presents the research data analysis and its findings, which cover the reliability and validity of the study instrument and the hypotheses testing findings. The next section provides a discussion that includes the implications of the study findings for theory and research. Finally, the last section presents conclusions.

2. PRIOR RESEARCH AND THEORETICAL FRAMEWORK

2.1. Cloud Computing and Higher Educational Environment

Cloud computing represents the convergence of two key trends in information technology: IT efficiency and business agility. IT efficiency entails leveraging highly scalable hardware and software resources to make better use of present computing capabilities. Business agility, on the other hand, is the ability to use IT as a competitive tool through rapid development and mobile interactive applications that respond instantly to user needs [19]; [17]. As a term, cloud computing is defined variously in the literature. In this study, the definition of cloud computing presented is compatible with NIST standards [20], which considers cloud computing as a collection of characteristics shared by all cloud computing services. Consequently, in the context of this paper, cloud computing refers to the applications and shared services used at the institutions studied via subscription-based models, through which shared data servers or application tasks can be made available. Cloud computing is continually altering the concepts of learning and business. Accordingly, academics and the business sectors have adopted novel technologies to remain contemporary with internal and external changes.

In higher education institutions, cloud computing has been considered mostly as a technical advancement with transformational potential [21]. This is due to the fact that cloud computing reaps the rewards of rapid IT implementation, particularly for research, which is considered more favourably when compared with conventional software solutions. Furthermore, Cloud computing technologies can be used as an aid in the implementation of socially oriented approaches to learning as well as collaborative education [22]; [23]. Cloud computing resources can be utilized to form e-learning platforms and educational services by centralizing data storage, virtualization, and other services [24]. With these considerations in mind, cloud computing services are becoming critical for various higher education institutions, and many of them rely on these services to lower costs, maintain competitiveness, and meet student and educator needs [25]. Cloud computing services compose of several notions, can be utilized to improve students' learning efficiency. According to Thomas [26], cloud computing allows students and educators to engage with one another at any time from any location and collaborate on the same documents to make modifications and improve the documents collectively. Many cloud-based applications have the ability to enhance engagement and active learning among students, which subsequently improves their performance [27]. For example, Checkpoints, Cloud, and Collaboration (C3) is a learning framework that has been developed to improve learning outcomes. The C3 Framework is designed to provide students with a structured approach to learning that incorporates the use of technology and collaboration. The C3 Framework consists of three key components: checkpoints, clouds, and collaboration. Checkpoints are used to monitor student progress and provide feedback on their performance. The cloud component provides students with access to online resources and tools that can be used for research, collaboration, and communication. Collaboration is an essential component of the C3 framework as it encourages students to work together on projects and assignments. The C3 framework has been shown to be effective in improving learning outcomes by providing students with a more engaging and interactive learning experience. By incorporating technology into the learning process, students are able to access a wider range of resources and collaborate more effectively with their peers.

This framework is based on the idea that learning should be a collaborative process where students work together to achieve their goals. The C3 Framework is designed to provide students with the tools they need to collaborate effectively, including cloud-based technology and regular checkpoints. The C3 framework is particularly useful for online learning environments, where collaboration can be challenging due to the lack of face-to-face interaction. By using cloud-based technology, students can easily share information and work together on projects in real-time. Regular checkpoints also help to keep students on track and ensure that they are making progress towards their goals. Overall, the C3 framework provides a powerful tool for improving learning outcomes for students. By promoting collaboration and providing students with the tools they need to succeed, this framework can help create a more engaging and effective learning environment for all learners [27].

Use of cloud services such as Classroom, G-mail, Google Docs, Dropbox, I-Cloud, and Sky Drive can be easily integrated into educational environments [11], which may efficiently improve educational institutions' ability to offer facilities or satisfy students' learning needs without investing in costly hardware or software or needing to train students [28]. Adoption of cloud computing has grown and become more pertinent to academic students and educators over the past few years. In response, it has become a growing trend among scholars to use several technology adoption models to comprehend how higher education students and educators adopted cloud computing [29]. For example, a study conducted by Asadi et al. [8] used the Theory of Planned Behavior (TPB) to investigate the determinants of cloud computing services among 240 faculty members in a medical university. The study found that attitude, perceived privacy/security, perceived behavioral control, intention, and subjective norms factors altogether explained about 59% of individuals’ behaviors toward adoption of cloud computing services [8]. Another study by Chiniah et al, [30] proposed a Hybrid model include Technology-Organization Environment Model (TOE) and Technology Acceptance Model (TAM) to evaluate the previously identified determinants for cloud adoption/non-adoption by the Mauritius ICT industry. The study surveyed 93 ICT-related companies/organizations and found that security is no longer the major concern for cloud adoption and companies are more focused on the advantages cloud computing can offer to their operations [30].

The literature review found that numerous studies on adoption of cloud computing in academic institutions had been published and that the pace of publication had been growing in recent years. IS scholars have often studied cloud computing adoption in higher education institutions from the perspective of individuals [11]; [13] or organizations [31]; [32]. Several theoretical and practical contributions have been examined, many of which imply that variables affecting the adoption of cloud computing in higher education institutions are numerous. This study contributes to this accumulated effort by proposing and developing a theoretical model that lends itself to investigating factors influencing cloud computing adoption among higher education students in Saudi Arabia.

2.2. The Decomposed Theory of Planned Behaviour (DTPB)

A deconstructed form of the TPB that combines a number of TAM and DOI elements is known as the Decomposed Theory of Planned Behaviour (DTPB). In comparison to the TAM and TPB models, it exhibits a similar match to the pure TPB model with a little higher predictive power [33]. The decomposed Theory of Planned Behaviour, according to Taylor and Todd, focuses on the aspects that are likely to impact system use to offer a more complete knowledge of behavioural intention [33] and "enables application of the model to a variety of situations" [34] because it makes the relationships between beliefs, attitudes, and intentions more transparent and understandable. In the DTPB, attitudes, normative beliefs, and control beliefs are divided and categorized according to the literature, the TAM and Diffusion of innovation theories. According to theories put out by academics, normative belief may be separated into relevant groups of references including subordinates, superiors, and peers each of whom has a unique viewpoint on how IT should be used. Taylor and Todd [33] have so utilized the two groups of peers and superiors to symbolize the breakdown of normative beliefs. In contrast, the control beliefs may be split into two separate categories: self-efficacy and facilitating conditions. Self-efficacy refers to one's perception of one's ability to use a new innovation, while the facilitating conditions group offers two aspects for control beliefs: one relates to resource factors like time and money, and the other concentrates on compatibility of technology difficulties which could constrain adoption [35]; [34].

3. Research Model and Hypotheses Development

A modified version of the DTPB model was utilized in the current study to better understand the factors influencing the decisions of higher education' students to use cloud computing in Saudi Arabia (see Figure 1). The next sub-sections provide a discussion of the model's structures as well as the proposed hypotheses.

3.1. Trust and User Attitude

In any business transaction, trust is a crucial component, especially in technological settings where there is uncertainty or insufficient product information [36]. Previous studies on the adoption of cloud computing have not extensively studied trust as a multidimensional construct; however, the majority of the literature supports the significance of a generalized trust construct as a determinant in cloud computing adoption. To know the importance of trust in the use of cloud computing, let's take a look at one of the aspects that requires trust and that affects the user's attitude towards it.

Within the cloud computing context, the trusting intentions were subsequently influenced by the trusting beliefs regarding cloud service providers, which predicted cloud adoption and success factors [37]. When analysing trust in the cloud provider, trust includes all related expectations, such as the conviction that the provider won't act opportunistically [37]. Cloud providers can create adverse circumstances for organizations or individuals using their services, and moving from one cloud provider to another can be costly and resource-intensive. Cloud providers may use standards, closed architectures, proprietary software or complex licensing schemes to keep customers captive [38]. It's also possible that a particular cloud provider will decide to disregard agreements, rules, or guarantees, or will otherwise falsify compliance, or will exploit the client organization in circumstances that aren't covered by the licensing agreement [37]. Thus, the relationship between perceived trust in cloud service provider and individuals' attitude toward the cloud technology adoption, have been shown to be significant and the key antecedents of behavioural intention to adopt the cloud [39]. Considering the above; the following hypothesis is formulated:

H1. The trust in cloud service providers has a significant and positive influence on higher education students ' attitudes toward the cloud.

3.2. Perceived usefulness, perceived ease of use and user attitude

Perceived usefulness is a concept that has been widely studied in the field of psychology and information systems. It refers to the degree to which an individual believes that a particular product or service will be beneficial in achieving their goals or solving their problems [40]. Scholars investigated whether users are driven to embrace a new technology due to its usefulness or fun. According to the findings of this study of [41], perceived usefulness is more influential than perceived fun in deciding whether to accept or reject computer technology [41]. In educational environment, perceived usefulness or relative advantages, and ease of use have been demonstrated in many prior studies to be antecedent drivers or factors that have positive influence on adoption of technology [42]; [43].

The perceived usefulness of using cloud computing for university students includes increased accessibility, flexibility, collaboration, and cost-effectiveness. One of the significant advantages of using cloud computing for university students is the ability to access course materials from anywhere at any time. With cloud-based storage solutions like Google Drive or Dropbox, students can easily upload and download lecture notes, assignments, and other study materials from their laptops or mobile devices. This flexibility allows them to study on-the-go without being tied down to a specific location. Another benefit of cloud computing for university students is collaboration with peers and professors. Cloud-based platforms like Google Docs allow multiple users to work on the same document simultaneously, making group projects more manageable and efficient. Additionally, professors can share class notes or assignments with their students through cloud-based learning management systems like Blackboard or Canvas. Another of the main benefits of cloud computing is its simplicity. Students do not need to worry about installing software or managing hardware, as everything is hosted in the cloud. This makes it easier for them to focus on their studies without having to deal with technical issues. Another advantage of cloud computing is its scalability. As students' needs change over time, they can easily scale up or down their usage of cloud services without having to invest in additional hardware or software licenses. Overall, the perceived ease of using cloud computing has made it a popular choice among university students. Its simplicity and scalability make it a convenient option for those who need to access their files and applications from anywhere at any time.

TAM that were proposed by Davis [40] to identify factors that influence users' acceptance of new technologies [44] proposes that two constructs (perceived ease of use and perceived usefulness) form the behavioral beliefs to be predictors of an individual's attitude to IT, which in turn determines their adoption of information technology. Within the main fundamentals of the TAM, it hypothesized that user acceptance of information technology is determined by his or her behavioral intention to use the IT, which can be predicted by his/her attitude towards using IT and his/her perception about the usefulness related to use. Thus, the following four hypotheses were occupied from the original TAM; however, they were adjusted for the existing study in order to be appropriate in this context.

H2: Perceived usefulness of the cloud has a significant and positive influence on attitudes toward the cloud.
H3: Perceived ease of use has a significant and positive influence on attitudes toward the cloud.
H4: Attitudes toward the cloud has a significant and positive influence on behavioral intention to use the cloud.
H5: Behavioral intention has a significant and positive influence on the actual use of the cloud.

3.3. Subjective Norm, Peer influences and user behavioural intention

An individual's perception of pressure from society from relevant referents to engage in or refrain from doing something is known as the subjective norm. [45]; [46]. In other terms, people are often interested in activities or objects if there is a positive attitude regarding them and think that influential persons believe they must do this [46]. In this case, the behaviour is using cloud technology for academic purposes; university students are heavily influenced by their peers when it comes to adopting new technologies. If their peers are using cloud technology for academic purposes, they are more likely to do so as well. This is because they feel that it is socially acceptable and expected of them.

It refers to the perceived pressure from peers to use cloud-based services. Students tend to follow what their friends are doing, and if their peers are using cloud-based services, they are likely to do so as well. This is because students want to fit in with their social group and be seen as tech-savvy. The group theory influence states that individuals often conform to the expectations of others in order to deepen associations with them or, in some circumstances, to evade punishment [47]; [48]. A student could think, for instance, that the teacher recommends using the e-learning system. A favourable effect on the subjective norm may happen if the student is very motivated to adhere to the teacher's expectations [48]. This further confirms the impact of subjective norm on intentional behaviour. This lends credence the effect of subjective norm on intentional behaviour. The theories of TPB [46] and TRA [45] use subjective norm to measure social effect on intentional behaviour. Consequently, numerous earlier research [8]; [49]; [50] proposed a positive correlation between behavioural intentions and subjective norms. Thus, we hypothesize the following:

H6. The higher education students' peer influences has a significant and positive influence on their subjective norm toward the cloud.

H7. The higher education students' subjective norm has a significant and positive influence on their intention to adopt the cloud.

3.4. Self-Efficacy & Behavioural Intention

Self-efficacy refers the perception of a person's ability to use new innovation. Self-efficacy is related to a person's belief in his or her capacity to do a certain activity within a specified field [51]; [48]. Self-efficacy is defined by Bandura [52] as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" [52]. The association among decisions regarding the usage of new technology and computer self-efficacy was supported by additional research [53]; [51]; [44]; [54]; [55]; [56].

In the context of cloud usage in education, university students who have a greater level of self-efficacy have a significant anticipation of being able use cloud computing successfully without relying on ongoing help, and as a consequence, they find cloud computing advantageous. As a result, they are more willing than others to adopt cloud computing [57]; [58]. Accordingly, we propose that the self-efficacy construct indirectly influences on adoption behaviour with its immediate impact on behavioural intention.

H8. The higher education students' self-efficacy has a significant and positive impact on their intention to adopt the cloud.

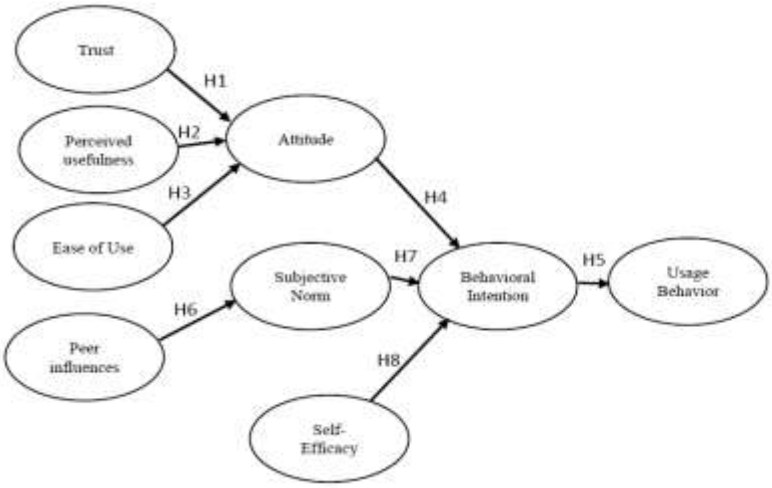

Figure 1. The study model

4. RESEARCH METHODOLOGY

4.1. Measurement

Defining the concepts or constructs that a researcher intends to test, and then selecting proper measuring methods to assess those constructs, is critical and has a substantial impact on the accuracy of findings [1]. In this research, the survey instrument was created by the researcher to test the study hypotheses. Items from prior studies were selected and included in the survey questionnaire to evaluate the constructs, which ensuring the scale's face (content) validity. The items have extensively employed in the majority of previous studies, which suggests that there is probably researchers' subjective acceptance that these measuring instruments seem to accurately represent the constructs of interest. In Table 1, the items created in this research for every construct are provided along with the prior studies from which they were adapted.

4.2. Data Collection Procedures

The purpose of this research is to identify the factors effecting adoption of the cloud computing phenomenon among higher education students in Saudi Arabia. To achieve the study goals, the study's sample surveyed students of Shaqra and Imam Mohammad Ibn Saud Islamic universities. A fully completed survey was obtained from 386 students. After checking the data for validity, 364 of them were deemed fit for use. In information systems research, an adequate sample size for undertaking partial least squares (PLS) path analysis is critical [60]. A typical information systems study would have at least 0.25 R-squared values, a 5% significance level, and 80% statistical power. A sample size of 59 is thought to be adequate when using such attributes with a maximum of three arrows pointing to a latent variable [61] as defined in the study's structural equation model (see Figure 1). However, with the aforementioned parameters and factor loadings of 0.5, the ideal sample size is 78 [60]. As a result, the sample size of 364 seemed to be more than adequate for this study.

5. DATA ANALYSIS AND RESULTS

5.1. Reliability and Validity

The instrument's internal consistency and reliability have been tested using the collected data from the pilot study of every component in the instrument. The findings indicate that alpha values ranged from .912 to .997, with a mean of .955 (see Table 2). This implies that each construct in the model was reliable. The internal consistency was therefore adequate.

Table 1. List of items by construct

Construct	Items	Adapted from
Peer Influences (PI)	My friends or my classmates would think that I should use Cloud computing. (It have been used in the first and second items to measure the Subjective Norm construct so will not be used again)	[2]
Self-Efficacy (SE)	I can use Cloud computing even if there was no one around to show me how to do it I can use Cloud computing with merely the online help function as a guide. I could easily utilize any of the Cloud computing websites on my own if I wanted to. Regardless of whether I had never used a system like it before, I would be able to use Cloud computing.	[2] [3]
Subjective Norm (SN)	My friends would think that I should use the Cloud computing to achieve my needs My colleagues/classmates would think that I should use the Cloud computing to achieve my needs People who are important to me would think that I should use the Cloud computing to achieve my needs	[2], [3].
Perceived usefulness (PU)	Cloud computing is more convenient than other traditional options. Cloud computing makes it easier to do my work Cloud computing improves my work Cloud computing help me to do my work more quickly I think that Cloud computing is useful. Overall, I think that using the Cloud computing is advantageous.	[4], [2], [5].
Perceived Ease of Use (EU)	Learning to use cloud computing was easy for me I find cloud computing easy to use When I use cloud computing, the English language is not an obstacle.	[4], [2], [5].
Attitude (AT)	I have positive opinion in cloud computing. I believe that using cloud computing is good to me. I believe that using cloud computing is appropriate for me.	[6], [3], [7].
The trust in cloud service provider (TT)	The cloud service provider guarantees the anonymity of users. The cloud service provider ensures the security of my personal data. The cloud service provider is efficient and always works reliably. The cloud service provider is predictable and unchanging. I can rely on the cloud service provider.	[8].

Behavioral intention (BI)	You intend to use cloud computing in next three months. You anticipate continuing to use cloud computing in the future.	[5], [7].
Cloud Computing Usage (US)	On average, each week you use your cloud account often. Every morning, you check your cloud account	[3], [7].

Table 2. Cronbach's Alpha Reliability of Constructs

Construct	**Number of Items**	**Cronbach's Alpha**
Self-Efficacy (SE)	4	.969
Perceived usefulness (PU)	6	.962
Perceived Ease of Use (EU)	3	.945
Attitude (AT)	3	.957
Peer Influences (PI)	1	.912
Subjective Norm (SN)	3	.964
The trust in cloud service provider (TT)	5	.997
Behavioural intention (BI)	2	.958
Cloud Computing Usage (US)	2	.942
Overall alpha value	29	.955

Construct validity was verified by employing factor analysis to evaluate a principal component analysis with a varimax rotation. This approach was used to assess the convergent and discriminant validity of items. Convergent validity was evaluated by assessing whether or not items from a variable converged on a single construct [67] and whether or not the factor loading for each item was more than 0.45, as recommended by Comrey and Lee [68]. According to Comrey and Lee [68], loadings more than 0.45 may be deemed reasonable, while loadings greater than 0.55 could be rated good, 0.63 very good, and 0.71 exceptional. Examining the cross-loading of items on various criteria indicated the discriminant validity. Table 3 shows that there is no evidence of weak loading.

Table 3. Construct-Based Item Factor Analysis

	Items					
	(-1-)	**(-2-)**	**(-3-)**	**(-4-)**	**(-5-)**	**Its evaluation**
SE1	.488	.314	.141	.307	.677	*Very good > 0.63*
SE2	.479	.525	.263	.224	.549	*Fair > 0.45*
SE3	.467	.312	.223	.340	.659	*Very good > 0.63*
SE4	.781	.470	.372	.065	.068	*Excellent > 0.71*
PU1	.543	.584	-.234	.355	.041	*Good > 0.55*
PU2	.580	.684	.327	-.015	.229	*Very good > 0.63*
PU3	.621	.532	-.292	.341	.163	*Very good > 0.63*
PU4	.675	.432	-.123	.451	.175	*Very good > 0.63*
PU5	.596	.551	-.194	.314	.189	*Good > 0.55*
PU6	.580	.684	.327	-.015	.229	*Very good > 0.63*
EU1	.736	.387	-.257	.385	.072	*Excellent > 0.71*
EU2	.467	.805	.257	-.034	-.131	*Excellent > 0.71*
EU3	.495	.752	.300	.132	.188	*Excellent > 0.71*
AT1	.678	.540	-.131	.238	.123	*Very good > 0.63*
AT2	.642	.460	-.161	.516	.047	*Very good > 0.63*
AT3	.560	.558	-.114	.412	.054	*Good > 0.55*
PI1	.499	.752	.291	.082	.226	*Excellent > 0.71*
SN1	.177	.139	.867	.223	.280	*Excellent > 0.71*
SN2	.173	.116	.746	.136	.554	*Excellent > 0.71*
SN3	.063	.131	.719	.181	.557	*Excellent > 0.71*
TT1	.270	.889	-.163	.140	.155	*Excellent > 0.71*
TT2	-.198	-.148	.835	-.213	-.143	*Excellent > 0.71*
TT3	.283	.897	-.171	.034	.182	*Excellent > 0.71*
TT4	-.289	-.207	.232	-.295	.799	*Excellent > 0.71*
TT5	.736	.387	-.257	.385	.072	*Excellent > 0.71*
BI1	.768	.478	-.152	.312	-.020	*Excellent > 0.71*
BI2	.758	.488	.392	.118	.056	*Excellent > 0.71*
US1	.630	.514	.355	.471	.020	*Very good > 0.63*
US1	.735	.527	-.135	.281	-.088	*Excellent > 0.71*

5.2. Hypotheses Testing

A theoretical model is proposed and developed in this study by adopting and extending TPB that lends itself to investigating trust, peer influences, perceived ease of use, and perceived usefulness as drivers of cloud adoption in Saudi Arabia (see Figure 2). The study's model was formulated through the testing of eight hypotheses. Pearson's correlation analysis was used to correlate all of the research variables, as shown in Table 4. As a consequence of the substantial correlations between the variables (p0.01), we used the regression model to test for multicollinearity by assessing collinearity statistics such as the variance inflation factor (VIF) and tolerance. To determine the existence of multicollinearity effects, we searched for any alerts produced by the AMOS report that suggested a problem of multicollinearity. The results indicate no evidence of multicollinearity. Furthermore, regression analysis was used to establish a framework for a more thorough examination of the potential issue of multicollinearity. As per Table 5, the tolerance values ranged between 0.949 and 0.400. The use of variance inflation factors (VIF) is the ideal and only known method to assess collinearity. Although a variance inflation factor (VIF) of below or equal to 10 (i.e., a tolerance of greater than 0.1) is commonly advised [62], a variance inflation factor (VIF) greater than 4 suggests substantial multicollinearity problems in this investigation. However, because the VIF values in the model ranged from 1.054 to 2.502, as shown in Table 5, there were no VIF values greater than 4. As a result, no evidence of multicollinearity was found.

Table 4. Variables correlation analysis

	US	BI	AT	PU	EU	TT	SN	SE
BI	.747*							
AT	.785*	.749*						
PU	.684*	.566*	.687*					
EU	.679*	.638*	.729*	.740*				
TT	.600*	.631*	.720*	.735*	.620*			
SN	.559*	.513*	.531*	.419*	.325*	.331*		
SE	.750*	.658*	.685*	.566*	.546*	.526*	.352*	
PI	.556*	.678*	.584*	.490*	.384*	.429*	.446*	.502*

US: Usage, BI: Behavioural intention, AT: Attitude, PU: Perceived Usefulness, EU Perceived Ease of Use, TT: trust in cloud service provider, SN: Subjective Norm, SE: Self-Efficacy, PI: Peer Influences.

* $p \leq 0.01$

Table 5. Multicollinearity examination

Dependent variable	Path direction	Independent variables (predictors)	Collinearity Statistics	
			Tolerance	VIF
Usage	←	Intention	.400	2.502
Intention	←	Attitude (AT)	.435	2.300
Intention	←	Subjective Norm (SN)	.718	1.392
Intention	←	Self-efficacy (SE)	.530	1.886
Attitude (AT)	←	The trust in cloud service provider (TT)	.457	2.188
Attitude (AT)	←	Perceived Usefulness (PU)	.661	1.513
Attitude (AT)	←	Perceived Ease of Use (EU)	.619	1.616
Subjective Norm (SN)	←	Peer Influences (PI)	.949	1.054

Multiple regression analysis was applied to evaluate the study's hypotheses after confirming that all relevant requirements had been satisfactorily met.

"Intention" and "Usage" were engaged in the initial regression. As seen in Fig. 2, "Intention" (0.747, Standardized path coefficient, p 0.05) is strongly and positively associated to "Usage" (adjusted R^2=0.56) (see Tables 6, 7, and 2). As a result, H8 is supported.

A regression analysis was then performed on "Behavioural Intention" using the three independent variables "Self-Efficacy," "Attitude," and "Subjective Norm." According to the results, which are depicted in Fig. 2, there is a significant relationship between "Behavioural Intention" and all three variables (adjusted R^2=0.619): "Attitude" (= 0.749, $p<0.05$ Standardized path coefficient), "Subjective Norm" (= 0.513, $p<0.05$ Standardized path coefficient), and "Self-Efficacy" (= 0.658, $p<0.05$ Standardized path coefficient) (see Figure 2, Table 6 and 7). Consequently, support is provided for H5, H6, and H7.

Then, "Attitude" was regressed on the three independent variables (i.e. "Trust in cloud computing service provider," "Perceived Usefulness," and "Perceived Ease of Use"). As shown in Fig. 2, the findings show that all three variables (adjusted R^2=0.649)—"Trust in cloud computing service provider" (0.720, Standardized path coefficient, p 0.05), "Perceived usefulness" (0.687, Standardized path coefficient, p 0.05), and "Perceived Ease of Use" (0.729, Standardized path coefficient, p 0.05)—have a significant relationship with "Attitude" H1, H2, and H3 are therefore supported.

Table 6. Coefficients for Proposed model

Dependent variable	Path direction	Independent variables (predictors)	Unstandardized Coefficients		Standardized Coefficients	Adjusted R^2	t	Sig.
			B	Std. Error	Beta			
Usage	←	Intention	.772	.027	.747	.557	28.765	.000
Intention	←	Attitude (AT)	.443	.034	.472	.619	12.909	.000
Intention	←	Subjective Norm (SN)	.137	.024	.165	.619	5.806	.000
Intention	←	Self-efficacy (SE)	.303	.036	.276	.619	8.348	.000
Attitude (AT)	←	The trust in cloud service provider (TT)	.317	.028	.399	.649	11.531	.000
Attitude (AT)	←	Perceived Usefulness (PU)	.088	.043	.082	.649	2.807	.000
Attitude (AT)	←	Perceived Ease of Use (EU)	.478	.040	.421	.649	12.085	.000
Subjective Norm (SN)	←	Peer Influences (PI)	.459	.042	.398	.589	10.986	.000

Table 7. Weights of Regression Standardized

Criterion variable	Path direction	Criterion variable predictors	Estimate	(Significance)
Usage	←	Intention	.747	Significant
Intention	←	Attitude (AT)	.749	Significant
Intention	←	Subjective Norm (SN)	.513	Significant
Intention	←	Self-efficacy (SE)	.658	Significant
Attitude (AT)	←	The trust in cloud service provider (TT)	.720	Significant
Attitude (AT)	←	Perceived Usefulness (PU)	.687	Significant
Attitude (AT)	←	Perceived Ease of Use (EU)	.729	Significant
Subjective Norm (SN)	←	Peer Influences (PI)	.446	Significant

"Peer Influences" and "Subjective Norm" were implemented in the final regression. As shown in Fig. 2, "Peer Influences" (β=0.446, p 0.05 Standardized path coefficient) is shown to be substantially and positively associated to "Subjective Norm" (adjusted R^2 = 0.589) (see Figure 2, Table 6 and 7). As a result, H4 is supported.

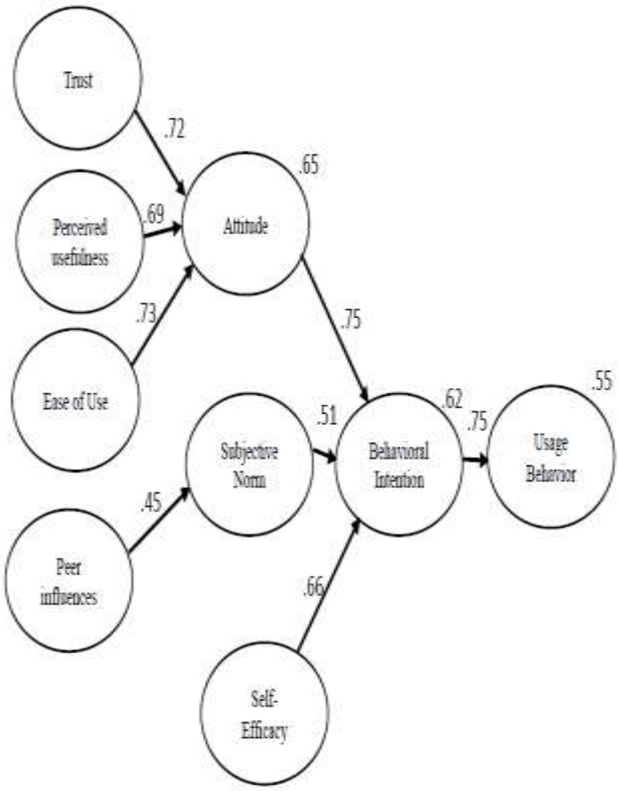

Figure 2. The study model

6. Discussion

One of the primary goals of this research was to identify the factors influencing cloud computing adoption using the theoretical TPB concept. The author extended TPB to investigate drivers of cloud adoption in Saudi Arabia by placing trust in the cloud computing service provider, peer influences, perceived usefulness, and ease of use as new constructs within TPB. The study model also investigated the factors influencing the decisions of higher education students in Saudi Arabia to use cloud computing. The study's findings demonstrate that the proposed model successfully explained a sizable portion of the variation in cloud adoption. All of the study hypotheses are supported. Cloud users' attitudes toward cloud adoption were found to be significantly influenced by perceived usefulness, perceived ease of use, and trust in cloud computing service provider variables.

In an earlier study, the author devised a formula to approximate the contribution of each model's factor to the explanatory power of the model [62].

$$A_x = \frac{{\beta_x}^2}{\sum_{k=1}^{n} {\beta_x}^2} \times {R_y}^2$$

Where:

A_x = Participation of variable A_x in a model' explanatory power

${\beta_x}^2$ = Square of beta coefficients or standardized coefficients of variable

${R_y}^2$ = Model' explanatory power (y)

$\sum_{k=1}^{n} {\beta_x}^2$ = Total of causal effects for the model's constructs

The study applies the equation mentioned above to calculate the explanatory power of every construct and its antecedents, as well as the rate at which each antecedent adds to a construct's explanatory power. The formula was used to calculate how much the "attitude's" antecedents contributed to its explanatory power. Table 8 summarizes the findings.

The findings demonstrate that university students' attitudes toward using cloud computing are significantly influenced by perceived ease of use, trust in cloud computing service provider and perceived usefulness, which have the ability to explain their attitude by 22.15%, 21.9% and 20.9% respectively.

Table 8. Attitude's variables' participation in its explanatory power

Antecedents	**Attitude**
Trust in cloud computing service provider (TT)	21.9%
Perceived Usefulness (PU)	20.9%
Perceived Ease of Use (EU)	22.15%
Total	65.00%

This proposes that the perceived usefulness of cloud computing encourages university students to use cloud computing to get their work done. Cloud computing has grown in popularity in recent years, and it offers various potential benefits for university students. The perceived usefulness of using cloud computing for university students includes increased accessibility, flexibility, collaboration, and cost-effectiveness.

One of the most significant advantages of cloud computing is its accessibility. Students can access their files and applications from any device with an internet connection, making it easier to work on assignments and projects from anywhere. This feature also allows for greater flexibility in terms of scheduling and location. Cloud computing also promotes collaboration among students. With cloud-based tools such as Google Drive or Microsoft OneDrive, multiple users can work on the same document simultaneously, making group projects more efficient and effective.

By collaborating with peers and sharing knowledge about best practices for using cloud computing platforms like Google Drive or Dropbox, students can streamline their work processes and improve their productivity.

Moreover, knowledge sharing can also help students overcome any technical difficulties they may encounter while using cloud computing tools. By working together and pooling their resources, students can troubleshoot issues more efficiently and effectively than if they were working alone [69].
Cloud computing is a technology that allows users to access and store data remotely, making it an attractive option for students who need to collaborate on projects or access their work from multiple devices. However, if the technology is difficult to learn and use, students may not see the value in using it. Therefore, it is important for universities to provide training and support for students to ensure they can effectively use cloud computing.

Additionally, the perceived usefulness of cloud computing may vary depending on the specific needs of each student. For example, a student who primarily works alone may not see as much benefit from using cloud computing as a student who frequently collaborates with others.

Moreover, cloud computing can be cost-effective for university students who may not have the resources to purchase expensive software or hardware. Cloud-based services often offer affordable subscription plans that allow students to access a variety of tools without breaking the bank.

Overall, the perceived usefulness of using cloud computing for university students is undeniable. Its accessibility, flexibility, collaboration features, and cost-effectiveness make it an attractive option for modern-day learners seeking a more efficient way to study and complete academic tasks.

While cloud computing can be a valuable tool for university students, its effectiveness depends on how well it meets each individual's needs and how easily it can be learned.

The results illustrate that the perceived ease of use motivates university students to use cloud computing to get their work done.

Cloud computing has become an increasingly popular technology among university students due to its convenience and accessibility. However, the perceived ease of use of cloud computing can have a significant impact on whether or not students choose to utilize this technology.

Perceived ease of use refers to the degree to which individuals believe that using a particular technology will be effortless and straightforward. If students perceive cloud computing as difficult or complicated to use, they may be less likely to adopt it for their academic needs.

On the other hand, if students perceive cloud computing as easy and user-friendly, they are more likely to embrace it as a valuable tool for storing and accessing their coursework, collaborating with peers, and completing assignments remotely. Therefore, it is crucial for universities to ensure that their students receive adequate training and support in using cloud computing technologies. By promoting the perceived ease of use of these tools among their student population, universities can encourage greater adoption of cloud computing and enhance the overall learning experience for their students.

The study's results also show that the students' attitudes toward cloud adoption were found to be significantly influenced by their trust in cloud computing service providers. Trust in cloud computing service providers refers to the confidence that users have in the reliability, security, and privacy of their data stored on cloud servers.

Reliability is a crucial factor in building trust between service providers and their clients. In the world of cloud computing, reliability is even more important as it involves the storage and management of sensitive data. For university students, cloud computing has become an essential tool for accessing course materials, collaborating with peers, and submitting assignments.

Service providers must ensure that their systems are reliable to maintain the trust of their clients. This means having robust security measures in place to protect against cyber threats and ensuring that data is backed up regularly to prevent loss. Service providers should also have a clear communication plan in place to inform clients of any potential disruptions or downtime.

Students must also be confident that their data is secure and safe from unauthorized access or theft. If they do not trust the service provider's ability to safeguard their data, they may be hesitant to adopt cloud computing solutions. To build trust in cloud computing service providers, universities should ensure that they partner with reputable and trustworthy companies with a proven track record of providing secure and reliable services. Additionally, universities should educate their students about best practices for securing their data when using cloud services. It is essential for universities to ensure that their students' data is safe and secure while using these services by partnering with trustworthy companies and educating them about best practices for securing their data.

Cloud service providers must ensure that they have robust security measures in place to protect student data from unauthorized access. They should also be transparent about how they collect, store, and use student data. This transparency builds trust and reassures students that their information is safe. When students trust cloud service providers, they are more likely to adopt cloud computing as a means of storing and accessing their data. This adoption can lead to increased productivity and collaboration among students. Thus, cloud service providers must prioritize security and transparency to build trust among users. By doing so, they can help unlock the full potential of cloud computing for educational purposes.

Once more, the Al-ghaith equation [62] was applied to determine the contribution of the students "intention" antecedents to its explaining ability, and the findings are outlined in Table 9. The findings demonstrates that "subjective norm" alone accounts for 33.95% of students' "intentions" regarding adoption of cloud computing, followed by "attitude," which explains roughly 14.24% of "behavioral intentions," and finally "self-efficacy," which explains 13.71%.

Table 9. Behavioural Intention variables' participation in its explanatory power

Antecedents	**Behavioural Intention**
Attitude (AT)	14.24%
Subjective Norm (SN)	33.95%
Self-efficacy (SE)	13.71%
Total	61.90%

The study has shown that subjective norms play an important role in shaping students' attitudes and intentions towards using cloud computing. Students who perceive high levels of social pressure to adopt these technologies are more likely to view them positively and intend to use them in their academic work.

The subjective norm refers to the perceived social pressure that individuals feel to conform to certain behaviors or beliefs. In the context of cloud computing, this can refer to the influence that peers or other members of a student's social network have on their decision to use cloud-based technologies.

Peer influences plays a crucial role in shaping the subjective norms and behaviors of university students towards cloud computing. Peer influence refers to the impact that peers have on an individual's behavior.

In the context of cloud computing, peer influence can play a significant role in shaping students' behavior towards this technology. If their peers are using cloud computing and find it beneficial, they may be more likely to adopt it themselves. Similarly, if their peers have negative experiences with cloud computing, they may be less likely to use it. Students tend to follow their peers' behavior when it comes to adopting new technologies such as cloud computing. The perception that using cloud computing is socially acceptable among peers can significantly impact their decision-making process.

Overall, peer influence and subjective norms are important factors that should be considered when designing strategies to promote the adoption of cloud computing among university students. By understanding these factors and addressing them appropriately, cloud service providers can increase the likelihood that university' students will embrace this technology and reap its benefits. They can leverage peer influences by encouraging early adopters to share their positive experiences with others.

Self-efficacy is the second crucial factor in determining an individual's intention to use cloud computing. In the context of university students, self-efficacy can be defined as the belief in one's ability to effectively use cloud computing technology for academic purposes. University students' self-efficacy towards using cloud computing can be influenced by various factors such as their prior experience, knowledge, and skills. The use of cloud computing has become increasingly popular among university students due to its convenience and accessibility. However, some students may lack the necessary skills or knowledge to use it effectively. This can lead to a decrease in their self-efficacy towards using cloud computing.

To improve self-efficacy, universities can provide training programs or workshops that focus on developing the necessary skills and knowledge required for effective use of cloud computing. Additionally, providing access to resources such as online tutorials or support services can also help increase self-efficacy. Thus, universities should focus on enhancing students' self-efficacy by providing adequate training, resources, and support for using cloud computing technology. This will not only increase their confidence but also improve their academic performance by enabling them to access resources more efficiently. Therefore, it is important for universities to recognize the significance of self-efficacy in promoting the adoption of new technologies such as cloud computing among their students.

REFERENCES

[1] W. Liu, "Research on cloud computing security problem and strategy," in 2012 2nd international conference on consumer electronics, communications and networks (CECNet), 2012.

[2] C. C. Chen and M. Nakayama, "Key factors increasing the trust and intention to adopt standard cloud-based applications," International Journal of Information Systems and Change Management, vol. 8, no. 2, pp. 144-159, 2016.

[3] ResearchAndMarkets, "Global cloud computing in higher education market, by institute type, by application, by ownership, by deployment, by region, estimation & forecast, 2017 - 2027,"

ResearchAndMarkets, September 2021. [Online]. Available: https://www.researchandmarkets.com/reports/5456925/global-cloud-computing-in-higher-education . [Accessed 3 April 2022].

[4] C. Rodríguez Monroy, G. C. Almarcha Arias and Y. Núñez Guerrero, "The new cloud computing paradigm: The way to IT seen as a utility," Latin American and Caribbean Journal of Engineering Education, vol. 6, no. 2, pp. 24-31, 2012.

[5] Y. A. Qasem, S. Asadi, R. Abdullah, Y. Yah, R. Atan, M. A. Al-Sharafi and A. A. Yassin, "A multi-analytical approach to predict the determinants of cloud computing adoption in higher education institutions," Applied Sciences, vol. 10, no. 14, p. 4905, 2020.

[6] B. Alexander, Social networking in higher education. The Tower and the Cloud, EDUCAUSE, 2008, pp. 197-201..

[7] R. N. Katz, The gathering cloud: Is this the end of the middle. The tower and the cloud: Higher education in the age of cloud computing, EDUCAUSE, 2008, pp. 2-42..

[8] Z. Asadi, M. Abdekhoda and H. Nadrian, "Cloud computing services adoption among higher education faculties: development of a standardized questionnaire," Education and Information Technologies, vol. 25, no. 1, pp. 175-191, 2020.

[9] N. Sultan, "Cloud computing for education: A new dawn?.," International Journal of Information Management, vol. 30, no. 2, pp. 109-116, 2010.

[10] S. Ashtari and A. Eydgahi, "Student perceptions of cloud applications effectiveness in higher education," Journal of computational science, vol. 23, pp. 173-180, 2017.

[11] I. Arpaci, "Antecedents and consequences of cloud computing adoption in education to achieve knowledge management," Computers in Human Behavior, vol. 70, pp. 382-390, 2017.

[12] R. Estriegana, J. A. Medina-Merodio and R. Barchino, "Student acceptance of virtual laboratory and practical work: An extension of the technology acceptance model," Computers & Education, vol. 135, pp. 1-14, 2019.

[13] J. A. González-Martínez, M. L. Bote-Lorenzo, E. Gómez-Sánchez and R. Cano-Parra, "Cloud computing and education: A state-of-the-art survey," Computers & Education, vol. 80, pp. 132-151, 2015.

[14] G. Militaru, A. A. Purcărea, O. D. Negoiţă and A. Niculescu, "Examining cloud computing adoption intention in higher education: exploratory study," in Exploring Services Science: 7th International Conference, IESS 2016, Bucharest, Romania, 2016.

[15] A. Sharma and U. K. Singh, "Modelling of Smart Risk Assessment Approach for Cloud Computing Environment using AI & supervised machine learning algorithms," Global Transitions Proceedings, pp. 1-358, 3 June 2022.

[16] S. A. Sheik and A. P. Muniyandi, "Secure authentication schemes in cloud computing with glimpse of artificial neural networks: A review," Cyber Security and Applications, vol. 1, p. 100002, 2023.

[17] S. Marston, Z. Li, S. Bandyopadhyay, J. Zhang and A. Ghalsasi, "Cloud computing—The business perspective," Decision support systems, vol. 51, no. 1, pp. 176-189, 2011.

[18] A. Khayer, M. S. Talukder, Y. Bao and M. Hossain, "Cloud computing adoption and its impact on SMEs' performance for cloud supported operations: A dual-stage analytical approach," Technology in Society, vol. 60, p. 101225, 2020.

[19] O. Ali, A. Shrestha, M. Ghasemaghaei and G. Beydoun, "Assessment of complexity in cloud computing adoption: A case study of local governments in Australia," Information Systems Frontiers, vol. 24, no. 2, pp. 595-617, 2022.

[20] P. Mell and T. Grance, The NIST definition of cloud computing. U.S. Department of Commerce, MD, USA: National Institute of Standards and Technology: Gaithersburg, 2011.

[21] M. A. Mohamed Hashim, I. Tlemsani and R. Matthews, "Higher education strategy in digital transformation.," Education and Information Technologies, pp. 1-25, 2021.

[22] G. Thorsteinsson, T. Page and A. Niculescu, "Using virtual reality for developing design communication," Studies in Informatics and Control, vol. 19, no. 1, pp. 93-106, 2010.

[23] F. P. Tulinayo, P. Ssentume and R. Najjuma, "Digital technologies in resource constrained higher institutions of learning: a study on students' acceptance and usability," International Journal of Educational Technology in Higher Education, vol. 15, no. 1, pp. 1-19, 2018.

[24] A. El Mhouti, M. Erradi and A. Nasseh, "Using cloud computing services in e-learning process: Benefits and challenges," Education and Information Technologies, vol. 23, pp. 893-909, 2018.

[25] R. Thavi, R. Jhaveri, V. Narwane, B. Gardas and N. Jafari Navimipour, "Role of cloud computing technology in the education sector," Journal of Engineering, Design and Technology, 2021.

[26] P. Y. Thomas, "Cloud computing: A potential paradigm for practising the scholarship of teaching and learning," The Electronic Library, vol. 29, no. 2, pp. 214-224, 2011.

[27] K. Bagley, "Checkpoints, cloud and collaboration (C3): A learning framework to improve learning outcomes for international students in computer science," Journal of Computing Sciences in Colleges, vol. 33, no. 6, p. 22–28, 2018.

[28] B. G. Batista, C. G. Ferreira, D. M. Segura , D. M. Leite Filho and M. M. Peixoto, "A QoS-driven approach for cloud computing addressing attributes of performance and security," Future Generation Computer Systems, vol. 68, p. 260–274, 2016.

[29] M. Sharma, R. Gupta and P. Acharya, "Analysing the adoption of cloud computing service: A systematic literature review," Global Knowledge, Memory and Communication, vol. 70, no. 1/2, pp. 114-153, 2020.

[30] A. Chiniah, A. E. Mungur and K. Naidoo Permal, "Evaluation of cloud computing adoption using a hybrid TAM/TOE model," in Information Systems Design and Intelligent Applications, Singapore, 2019.

[31] A. N. Tashkandi and I. M. Al-Jabri, "Cloud computing adoption by higher education institutions in Saudi Arabia: an exploratory study," Cluster Computing, vol. 18, pp. 1527-1537, 2015.

[32] Y. A. Qasem, R. Abdullah, Y. Yah, R. Atan, M. A. Al-Sharafi and M. Al-Emran, "Towards the development of a comprehensive theoretical model for examining the cloud computing adoption at the organizational level," Recent Advances in Intelligent Systems and Smart Applications, pp. 63-74, 2021.

[33] S. Taylor and P. A. Todd, "Understanding information technology usage: A test of competing models," Information systems research, vol. 6, no. 2, pp. 144-176, 1995.

[34] M. Hernandez and J. Mazzon, "Adoption of internet banking: proposition and implementation of an integrated methodology approach," The International Journal of Bank Marketing, vol. 25, no. 2, pp. 72-88, 2007.

[35] Y. C. Ku, R. Chen and H. Zhang, "Why do users continue using social networking sites? An exploratory study of members in the United States and Taiwan," Information & Management, vol. 50, no. 7, pp. 571-581, 2013.

[36] Z. Belkhamza and S. Wafa, "The Effect of Perceived Risk on the Intention to Use E-commerce: The Case of Algeria," Journal of Internet Banking and Commerce, vol. 14, no. 1, pp. 1-10, 2009.

[37] J. Lansing and A. Sunyaev, "Trust in cloud computing: Conceptual typology and trust-building antecedents," ACM sigmis database: The database for advances in Information Systems, vol. 47, no. 2, pp. 58-96, 2016.

[38] J. Opara-Martins, R. Sahandi and F. Tian, "Critical review of vendor lock-in and its impact on adoption of cloud computing," in International Conference on Information Society (i-Society 2014), IEEE, 2014.

[39] E. Udoh, "Technology acceptance model applied to the adoption of grid and cloud technology," International Journal of Grid and High Performance Computing (IJGHPC), vol. 4, no. 1, pp. 1-20, 2012.

[40] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," MIS Quarterly, vol. 13, no. 3, pp. 319-340, 1989.

[41] M. Igbaria, S. J. Schiffman and T. J. Wieckowski, "The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology," Behaviour & information technology, vol. 13, no. 6, pp. 349-361, 1994.

[42] F. Abdullah and R. Ward, "Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors," Computers in human behavior, vol. 56, pp. 238-256, 2016.

[43] A. Granić and N. Marangunić, "Technology acceptance model in educational context: A systematic literature review," British Journal of Educational Technology, vol. 50, no. 5, pp. 2572-2593, 2019.

[44] F. D. Davis, R. P. Bagozzi and P. R. Warshaw, "User acceptance of computer technology: A comparison of two theoretical models," Management Science, vol. 35, no. 8, pp. 982-1003, 1989.

[45] I. Ajzen and M. Fishbein, Understanding Attitudes and Predicting Social Behaviour, Englewood Cliffs, NJ: Prentice-Hall, 1980.

[46] I. Ajzen, "The theory of planned behaviour," Organizational Behaviour and Human Decision Processes, vol. 50, no. 2, pp. 179-211, 1991.

[47] M. Deutsch and H. Gerard, "Deutsch, M., & Gerard, H. (1995). A study of normative and informational social influences upon individual judgment," Journal of Abnormal and Social Psychology, vol. 51, pp. 624-36, 1995.
[48] Y. C. Lee, "An empirical investigation into factors influencing the adoption of an e-learning system," Online Information Review, vol. 30, no. 5, pp. 517-541, 2006.
[49] E. J. Kim, J. J. Kim and S. H. Han, "Understanding student acceptance of online learning systems in higher education: Application of social psychology theories with consideration of user innovativeness," Sustainability, vol. 13, no. 2, p. 896, 2021.
[50] W. L. Shiau and P. Y. Chau, "Understanding behavioral intention to use a cloud computing classroom: A multiple model comparison approach," Information & Management, vol. 53, no. 3, pp. 355-365, 2016.
[51] D. R. Compeau and C. A. Higgins, "Computer self-efficacy: development of a measure and initial test," MIS Quarterly, vol. 19, no. 2, pp. 189-211, 1995.
[52] A. Bandura, "Self-efficacy: toward a unifying theory of behavioural change," Psychol Rev, vol. 84, no. 2, pp. 191-215, 1997.
[53] D. R. Compeau and S. Huff, "Social cognitive theory and individual reactions to computing technology: a longitudinal study," MIS Quarterly, vol. 23, no. 2, pp. 145-158, 1999.
[54] T. Hill, N. D. Smith and M. F. Mann, "Role of efficacy expectations in predicting the decision to use advanced technologies: the case of computers," Journal of Applied Psychology, vol. 72, no. 2, p. 307– 313, 1997.
[55] M. Hsu and C. Chiu, "Internet self-efficacy and electronic service acceptance," Decision Support Systems, vol. 38, no. 3, pp. 369-381, 2004.
[56] Igbaria and M. J. Iivari, "The effects of self-efficacy on computer usage," Omega, vol. 23, no. 6, p. 587–605, 1995.
[57] C. Huang, "Gender differences in academic self-efficacy: A meta-analysis," European journal of psychology of education, vol. 28, pp. 1-35, 2013.
[58] T. Muthuprasad, S. Aiswarya, K. S. Aditya and G. K. Jha, "Students' perception and preference for online education in India during COVID-19 pandemic," Social sciences & humanities open, vol. 3, no. 1, p. 100101, 2021.
[59] E. Bell, A. Bryman and B. Harley, Business research methods, Oxford university press, 2022.
[60] G. A. Marcoulides and C. Saunders, "Editor's comments: PLS: a silver bullet?," MIS quarterly, pp. iii-ix, 2006.
[61] K. K. K. Wong, "Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS," Marketing Bulletin, vol. 24, no. 1, pp. 1-32, 2013.
[62] W. Al-Ghaith, "Understanding social network usage: impact of co-presence, intimacy, and immediacy," International Journal of Advanced Computer Science and Applications, vol. 6, no. 8, pp. 99-111, 2015.
[63] G. C. Moore and I. Benbasat, "Development of an instrument to measure the perceptions of adopting an information technology innovation," Information systems research, vol. 2, no. 3, pp. 192-222, 1991.
[64] W. Al-Ghaith, "Applying and extending the Technology Acceptance Model to understand Social Networking Sites (SNS) Usage: Toward proposing a comprehensive model," in Proceedings of the The 3rd Multidisciplinary International Social Networks Conference on Social Informatics 2016, Data Science 2016 (pp. 1-8), ACM, 2016.
[65] W. Al-Ghaith, "Emerging Applications on Smart Phones: The Role of Privacy Concerns and its Antecedents on Smart Phones Usage," International Journal of Computer Science & Information Technology (IJCSIT), vol. 13, 2021.
[66] J. Ejdys, "Building technology trust in ICT application at a university," International Journal of Emerging Markets, 2018.
[67] G. Premkumar and K. Ramamurthy, "The role of Interorganizational and organizational factors of the decision mode for adoption of interorganizational systems," Decision Science, vol. 26, no. 3, pp. 303-336, 1995.
[68] A. L. Comrey and H. B. Lee, A first course in factor analysis, N.J.:L.: Erlbaum Associates, 1992.
[69] Z. Ali, B. Gongbing and A. Mehreen, "Understanding and predicting academic performance through cloud computing adoption: A perspective of technology acceptance model," Journal of Computers in Education, vol. 5, pp. 297-327, 2018.

AUTHOR

Waleed A. Alghaith is an Associate Professor of Information systems at Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia. His areas of expertise are information technology research, internet research, technology adoption, data science, sentiment analysis, cloud computing, artificial intelligence and organizational intelligence technologies. Email: waalghaith@imamu.edu.sa