A FRAMEWORK OF E-LEARNING CHALLENGES DURING COVID-19 IN HIGHER EDUCATION INSINUATIONS OF PAKISTAN

IMRAN KHAN KEERIO, ASADULLAH SHAH,

MASOOMI HIFAZAT ALI SHAH, NAJHAN MUHAMAD IBRAHIM, HAZWANI MOHD MOHADIS, IMRAN AHMED QURESHI

Department of Information System, Kulliyyah of Information and Communication Technology, International Islamic University Malaysia, Kuala Lumpur,

Malaysia

*Corresponding author: imran_keerio@yahoo.com

ABSTRACT: eLearning is a process of acquiring information with the help of computing devices. The eLearning facility will be available anytime, anywhere, when these computing devices are connected to a network. The real benefit of eLearning was observed during covid-19 when all education institutions suspended their physical classes as social distance was necessary due to the pandemic situation in the world. While having serval advantages of eLearning, the researchers observed several problems, not only in the covid-19 case but even before the pandemic for its adoption/acceptance. Some of the well-known issues faced by the students of higher education institutions enlightened from the literature review are Cost, System Quality, System Complexity, Infrastructure, Social influence, facilitating conditions, and student learning motivations. These problems are still researchable, especially in an underdevelopment country like Pakistan. In this study, a framework has been developed with the help of various models and theories used for Information system research, i.e. (TAM3, UTAUT, M&D, TRA, and IDT). Observing problems from the literature review, some constructs/variables (Perceived Cost, System Quality, Complexity, Social Influence, Facilitating Condition, student learning motivation, PEOU, PU, and BI). are selected to make hypotheses for the framework. The study aims to find the most critical factors affecting eLearning's slow acceptance/adoption throughout the covid-19 in Pakistan.

KEY WORDS: *eLearning, covid-19, Framework, Pakistan*

1. INTRODUCTION

The definition of learning is to formulate new knowledge, skills, and behavior. If the learning is achieved with the help of electronic devices, it is called eLearning, and if these devices are connected to the internet, that is called online learning. Online learning involves the internet and related network technologies, so the learning material can be designed and delivered to the students, which can be far away from the instructor (Cross, J, 2004). eLearning is a very flexible platform for students to acquire their education, as it offers education on-demand at a distance. (Saxena. et al., 2021; Liaw, S. S. 2008) There are several commercial applications of eLearning; for example, web-based training, distributed learning, virtual learning,

etc. (Alla, et al., 2013). The most common e-learning platforms for students and teachers are Google Classroom, MS Team Zoom, and YouTube (Mastan, et al., 2022). These common platforms provided education at distance facilities with the help of information technology. To make eLearning successful several elements are involved, such as proper training of human resources, teachers' motivation, making the course up to the standard, provision of sufficient teaching material to the students, and selection of suitable online tools for content delivery. (Uppal, M. A. 2017).

As the coronavirus pandemic appeared in 2019 China, education in several countries was affected as social distancing was mandatory. Almost all educational institutions closed their physical education activities (Rehman, et al., 2021); as per UNESCO, 1.6 billion students were involved globally Dhawan, S. (2020). To deal with this newly developed challenge for educational institutions, eLearning was the only option by which they could resume their educational activities while maintaining social distance. Through eLearning, there are several benefits to the students and institutions; for example, it's a flexible choice for the student as they can access it from anywhere, and for the institutions, the running cost can be saved (Siron, et al., 2020). While having several benefits, the adaptation/acceptance of eLearning still has several challenges, especially in a country like Pakistan. This study will explore the problems students face in eLearning during covid-19 and formulate a framework to solve them accordingly.

2. LITERATURE REVIEW

The literature for this study mainly focuses on finding the eLearning barriers faced by the students and their acceptance or rejection of technology during the covid-19 time. Many IT/IS models and theories are explored to see user behavior for eLearning during the covid-19 time. Scholars used some of the famous models and theories frequently to solve the problems faced by the users, such as TPB, IDT, TRA, TAM, and UTAUT, and to find their behavior. All these models and theories were tested in different countries as per their cultures and geographical locations. Table 1 has columns Author, Study, Model used, and barriers identified formulated to represent the literature review for this study.

Table 1: Literature review

Author	Study	Model used	Barriers identified
(Mailizar et al., 2021)	To find the teacher's behavior toward using eLearning	TAM	Student Attitude
(Fauzi, et al., 2021)	Student Acceptance of eLearning google classrooms in covid-19	TAM	Facilitating condition
(Alturki, et al., 2022)	Student Perception of mobile use during covid-19	TAM	Student satisfaction
(Aloulou, et al., 2022)	eLearning system in higher education of UAE in covid-19	TAM	Instructor reediness
(Asvial, et al., 2021)	A case study of distance learning	UTAUT	Cost
(Altalbe, et al., 2021)	Actual use of eLearning in KSA during covid	D&M	System Quality

(Al-Rahmi, et al., 2021)	Factors Influencing eLearning in Malaysia	IDT	Complexity
(Utami, et al., 2022)	The willingness of instructors to use cloud base learning in covid-19	TAM	Social Influence
(Nikou, et al., 2021)	Perception of Student eLearning in covid	TAM	Covid-19
(Raza, et al., 2021)	Social isolation and covid fear influenced eLearning in Pakistan	UTAUT	Covid-19 Fear
(Younas, et al., 2021)	Effect of design issue on Learners to Use eLearning	TAM	Application complexity
(Sarosa, et al., 2021)	Effect of Cost on eLearning Acceptance	TRA	Cost

3. USER BEHAVIOR IDENTIFICATION MODELS AND THEORIES.

In the last few decades, the organization has developed several technologies related to information systems, for which it is essential to find the acceptance of these technologies by the users. In this regard, researchers are investigating the user's behavior using information system theories and models to see the actual intention to use these technologies (Viswanath, et al., 2003; Jurevičiūtė, et al., 2013). Many theories and models are available to find the uses of behavioral intention. Still, some of them are very frequently used by scholars, such as TPB, TRA, IDT, M&D, TAM, and UTAUT, as enlisted from the literature review in the above section. These theories and models provide an excellent understanding of the leading factors and their acceptance and rejection by users in the field of IS/IT (Jurevičiūtė, et al., 2013). Further details of these models and theories are available in the following sections.

Although these models and theories used to accept or reject the technologies have a substantial contribution, there is a need to be a better fit to solve the research problems; each has its own advantages and disadvantages.

3.1. Theory of Reasoned Action (TRA)

In 1975 a scholar named Fishbein & Azjenin's TRA proposed this theory to find people's behavior. Initially, it was used to predict voting conduct. (Ajzen, I., & Fishbein, M. 1975) this theory works on three basic contracts (Behavioral Beliefs, Normative-Beliefs, and Control beliefs), which influence behavior. Further details of constructs and their relations ships are depicted in the following picture
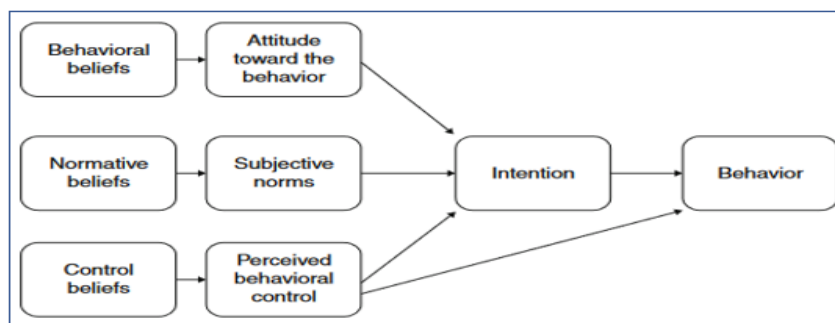

Fig.1. Theory-of-Reasoned-Action (Ajzen, 1975)

3.2. Innovation Diffusion Theory (IDT)

E.M Rogers proposed this theory in 1962 in the social sciences, explaining that an idea or product does not diffuse simultaneously in the social system. Instead, it diffused in steps. This theory divided adopters into five categories: (Innovators, Early Adopters, Early Majority, and Late Majority Laggards) and attributes complexity, advantages, trainability compatibility, and observability which can affect the transmission of technologies. Scholars around the globe used this theory extensively in the field of IS/IT to find the users' behavioral intentions. The major disadvantage of this theory is that it only focuses on individuals rather than organizations. (Ratts, et al,. 2011) the following picture shows the five categories of this theory.
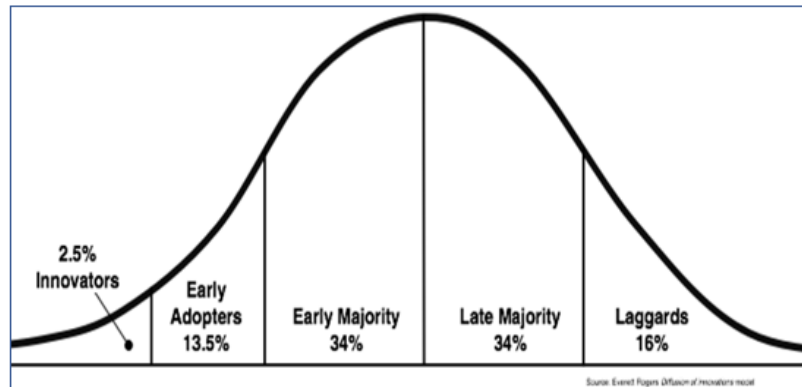

Fig.2. Innovation Diffusion Theory (Wani, 2015)

3.3. DeLone and Mclean Model

DeLone and Mclean" suggest a model for user satisfaction for information technology and information system. Researchers frequently use it to know the adoption of technology by users. For example, Adeyemi I. O, in 2020, conducted a study regarding satisfaction with the compulsory use of web portals and found students' satisfaction. This model comprises three independent variables: self-regulating (System-Quality, Information Quality, and Service-Quality). The main disadvantage of this model is that system having a complex and multi-dimensional autonomous nature cannot be predicted using this model (DeLone, W. H., & McLean. 2013). The relation among variables is shown in the following picture
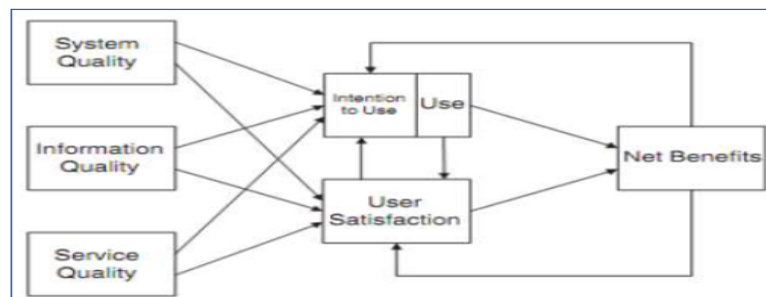

Fig.3. D & M, Model. (DeLone, 2013)

3.4.(UTAUT) Unified Theory Of Acceptance And Use Of Technology.

Venkatesh and others proposed UTAUT in 2003 for "User acceptance of information technology. It consists of six primary constructs: performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention to check the user's willingness to use the system. Its disadvantage is that it does not assess the actual usage of a particular technology; it represents only one organization's culture or country, which can be measured at only one point at a time, so it is challenging to generalize the result. (Sukendro et al,. 2020)
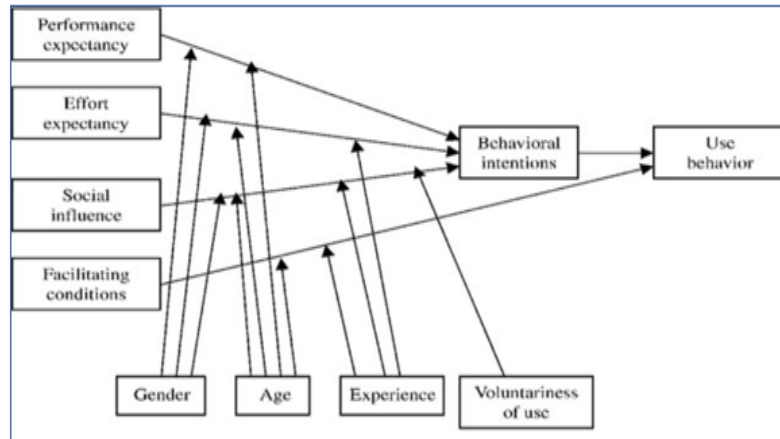

Fig.4. UTAUT Model (Venkatesh et al., 2003)

3.5. Technology acceptance model (TAM)

The theory for TAM was developed in late 1980 by F-Davis, to predict the usage and acceptance of any new technology by human beings. This model is widely used to predict the acceptance of IS/IT; it has been used mainly for the World Wide Web and various other software. TAM has some variants, such as TAM2 and TAM3. One of the disadvantages of TAM is that it has a limited explanation of intention variance, does not address the voluntariness of use and facilitating factors, and fails to express the individual difference.
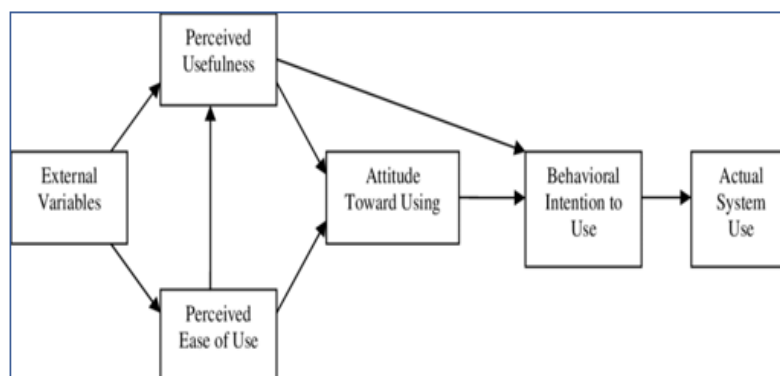(Sukendro, et al,. 2020)

Fig.5. TAM Model (Davis, 1989)

4. Proposed Framework

From the literature review, it becomes known that researchers widely use this TAM model to find the acceptance or rejection behavior of the users in IS/IT. (Sukendro, et al, 2020). Despite its vast use, researchers are still working on this model to find out how the fusion of other models and variables can predict the ease of use of the technologies. Wang, W., & Benbasat, I. (2005). As per some researchers, adding some constructs, such as task easiness and user appearances, is necessary to increase its explanatory power due to the simplicity and disadvantages of this model. (Sukendro, et al, 2020; Moon, et al., 2001). This model is later extended by including social influence and facilitating conditions to become TAM2 (Venkatesh, V. and Davis, F.D. (2000). Regardless of the addition of these two constructs, it reflects partially and by no means suitable for all technical parts (Qingfei, et al., 2008). As per one researcher, Lu, J. TAM, and TAM2 can only clarify 40 percent of IS/IT usage (Lu, et al., 2005). It should be combined with other models to achieve the best results and predict its power. (Jeyaraj et al, 2006) Sometimes the problems are very complex and multi-dimension in nature for that type of research; it is hard to predict users' behavior using only a single model. (Qingfei, et al., 2008; Ra'ed (Moh'd Taisir) et al, 2013). So, keeping in mind all these suggestions by the researchers for this study, a framework comprising theories and models like TAM, IDT, TRA, TPB, and UTAUT and their selected constructs and variables, i.e. (Perceived Cost, System Quality, Complexity, Social Influence, Facilitating Condition, Covid-19 (moderator variable), PEOU, PU, and BI) has been formulated to predict the student's behaviors toward eLearning during covid-19. The following picture provides the conceptual framework for this study.
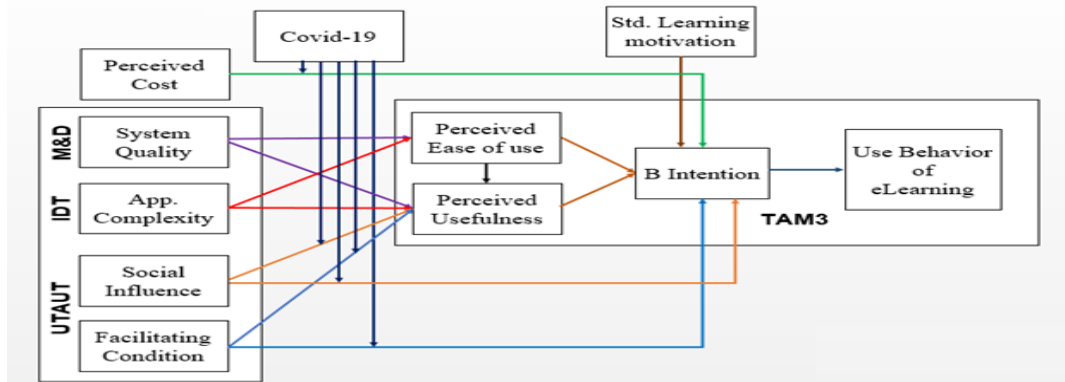

Fig.6. A Proposed Framework for Research

Using this model, the relationship among the variables, a suggestion of hypothesis, research aims, and objectives can be found. In the model, TAM3 has been chosen as a base for this model as it is the latest in its family, along with other models. This model has a close relationship between behavioral intention and actual use. The behavioral intention has several advantages as it investigates whether participation in the actual use of eLearning may encourage or discourage them from contributing to the study. (Kiraz, et al,. 2006; Ajzen, I. 1991). Behavioral intention is a highly effective variable compared to basic services (Mailizar et al., 2021) for this research. Behavior intention is the dependent variable that will further lead to the use of e-learning during covid-19 in Pakistan.

5. FACTORS INFLUENCING SLOW ADOPTON OF ELEARNING THROUGHOUT COVID-19

During covid-19, there were several problems/factors faced by the students to adopt eLearning., some of them were most common, as explored in the literature review section, especially in underdevelopment countries like Pakistan. These prominent factors are selected for this study to investigate them by conducting proper research. The details of these issues are.

5.1. Perceived Usefulness (PU)

The degree to which a user trusts that using a particular system would improve his or her job performance. It is the most significant factor which is influencing eLearning acceptance throughout covid-19. It motivates the user to adopt the system rapidly. (Arif, et al, 2022; Keržič, et al, 2019; Amsal, et al, 2020). In this Model, perceived usefulness has been taken for predicting the effectiveness of eLearning systems. So, the hypothesis for PU is.

H1. PU will have an encouraging effect on BI to accept eLearning throughout covid-19.

5.2. Perceived Ease of Use (PEOU)

Perceived Ease of Use: The ease associated with using the system. Several studies related to online learning have proven that PEOU and PU positively affect BI. (Wei, et al,. , 1989; Wang, W., & Benbasat, I. 2005). Therefore, it is theorized as under:

H2a. PEOU of use will have an encouraging effect on BI to accept eLearning throughout covid-19.
H2b. PEOU will have an encouraging effect on PU to accept eLearning throughout covid-19.

5.3. Perceived Cost (PC)

Perceived Cost: It is the expenses the user requires, including equipment and the Internet cost (Costs. et al., 2021). Due to covid-19, the impact of internet costs has been transferred to the students, negatively impacting eLearning acceptance. (Wei, et al, 2009; Sarosa, S. 2021; Asvial, et al, 2021; Zhou, T. 2011). The cost is taken in this study by considering the observations suggested by researchers to examine its effect on the user's behavior intention for accepting eLearning during covid-19. So, it is theorized as under:

H3. PC will have a discouraging effect on BI to accept eLearning throughout covid-19.

5.4. System Quality (SQ)

System Quality: The level at which the system requires minimum effort for its utilization. For eLearning success, the system quality is the primary factor and directly influences PU from the student's perspective. (Calisir, et al, 2015; Jaber, O. A. 2016; Alkhawaja, et al, 2022). Another study suggests that a system with technical problems may negatively impact users' willingness to accept it. (Ghazal et al, 2017; Costa, et al, 2016).

In this study, the system quality has been taken concerning the availability and response time, so the hypothesis for System quality is.

H4a. SQ, regarding availability and response time, will have an encouraging effect on PEOU.

H4b. Regarding availability and response time, SQ will have an encouraging effect on PU.

5.5. Application Complexity (CO):

Complexity is the difficulty of understanding and accepting the system (Lee, et al, 2011). Complexity determines user intention to use the system, particularly by its difficulty in understanding and using it (Davis,1989). More complex eLearning systems have less probability of acceptance. (Shih, C. H. 2007; Hardgrave, et al, 2003)

This study uses complexity to mention the degree of hardness seen by the students and teachers that affect their performance, so the hypothesis for complexity is as follows.

H5a. CO will have a discouraging effect on Perceived Ease of use.

H5b. CO will have a discouraging effect on Perceived usefulness.

5.6. Social Influence (SI)

Social influence: It is the degree of a particular person's perception about how significant others, including his Friends, Family, and co-workers, believe that he or she should use the new system. (Viswanath, et al, 2003; Jokar, et al, 2013; Rutherford, B. N. 2010).As for e-learning, especially in covid-19 type situations, teachers and family members can provide social support to students to create their behavior and intention to accept the system. (Huang, et al. 2010; Cheng, S. T., & Chan, A. C. 2004).In this study, social influence has been taken in terms of family, friends, & teacher support to the students throughout covid-19 to accept eLearning. It is hypothesized as follows:

H6a. The SI will have an encouraging effect on PU to accept eLearning throughout covid-19.

H6b. The SI will have an encouraging effect on BI to accept eLearning throughout covid-
19.

5.7. Facilitating conditions

Facilitating conditions: It is a point at which the user considers that the technical infrastructure is good enough to support the use of technology. It will determine students' understanding and how the required tool, services, and technical support will increase the ease of use for e-learning. (Viswanath, et al, 2003; Jameel, et al, 2020; Gunasinghe, et al, 2019). The availability of infrastructure and services will increase the chances of easy access to e-learning resources. FC has a positive and vital effect on behavioral intention. (Roman, et al, 2021; Kapasia, et al, 2020). In this study, FC has been taken to find the slow acceptance/adoption of eLearning in Pakistan. So, its hypothesis is as follows.

H8a. FC will have an encouraging effect on PEOU to accept eLearning throughout covid-19

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H8b. FC will have an encouraging effect on BI to accept eLearning throughout covid-19.

5.8. Moderating Effect of Covid-19

The moderating effect of Covid-19 can be described as moderating the influence of covid-19 epidemic in terms of (lockdown & covid-19 fear). One of the studies provided evidence that psychological distress and anxiety negatively affect the acceptance/adaptation of eLearning under covid-19 lockdown pressure (Roman, et al, 2021; Kapasia, et al, 2020). Indian West Bengal universities faced several challenges during lockdowns: stress, depression, slow internet, uncomfortable environment, and anxiety. Kombe, C. L., & Mtonga, D. E. (2021). In this study, covid-19 has been taken as moderating variable to explore its effect on cost, social influence, and facilitating condition, which turns to impact on BI, and it is hypothesized as follows:

H9a. Covid-19 Lockdown moderates the relationship between PC and BI

H9b. The covid-19 lockdown moderates the relationship between SI and PEOU

H9c. Covid-19 lockdown moderates the relationship between SI and PU

H9d. Covid-19 Lockdown moderates the relationship between FC and PEOU

H9e. Covid-19 Lockdown moderates the relationship between FC and PU

5.9. Student Learning Motivation.

It is the willingness tact to achieve the targets. It is a significant factor that decided success or failure Mao, Z. (2011). Students must be motivated to adopt eLearning in a pandemic like covid-19 (Kakepotoa, et al, 2021). Students obtaining higher grades were more motivated than those with lower grades (Kong, Y. 2009; Pintrich, P. R., & Schunk, D. H. 2002; Siron, et al.2020). In this study, the student motivation factor has been taken to find its effect on behavior intention to use eLearning.

H10. Student Motivation will have an encouraging effect on Intention to use to adopt eLearning throughout covid-19.

6. METHODOLOGY

The measurement technique used for this research is a quantitative survey-based approach, a questionnaire with 7 points Likert scale is prepared to collect the data from respondents. There will be self-admirative uniform distribution through WhatsApp for this study. (Teddlie, C., & Yu, F. 2007; Malook, M. 2016; Davis, 1989).

The reason for selecting this type of measurement technique is that in the past several scholars selected this type of strategy to measure their models for example. Fauzi and their co-authors selected this type of measurement strategy to measure their models (Fauzi, et al, 2021) another study conducted by Altalbe selected the same strategy to evaluate his model (Altalbe, A. 2021). A correlation formulation design is used in the study to determine how the different factors and constructs relate. Statistical methods and equations will be used to look at the information from the poll. Along with the Smart PLS-SEM4 tool, SPSS software from the third generation will be used to look at data. The population for this study will be two million students of higher education, and the sample size will be 300 to 400

responses. The inclusion criteria are Students and Teachers who used e-learning during covid-19, and the sampling technique is clustered sampling as a geographic sampling (Four clusters) Sindh, Khyber Pakhtunkhwa, Punjab, and Baluchistan Public sectors Universities. The reason for selecting the cluster sampling is according to Teddlie and Yu (2007) suggest selecting clusters to collect data if the population is widely scattered in a large area. Second, eLearning during covid-19 was unanticipated, and the quick shift from face-to-face to online education challenged students and educators worldwide. Thus, obtaining data from the all students of the country is impossible. Third, universities are in practically every major city, even in rural areas with large populations. To get the required findings, this study uses cluster sampling due to geographic constraints. The tool for this study is a survey Questionnaire scale seven-point Likert with a quantitative cross-sectional approach.

6.1. Pretesting

Once the survey questionnaire is prepared, it is essential to conduct the pretest on a designed questionnaire. From the pretest, questioner problems can be predicted, overcome the measurement error, reduce the burden on the respondent, find out whether the respondents understand questions correctly, and certify that the order of questions is not manipulated in how a respondent answer. For pretesting of this study, the survey questionnaire has been verified and critically examined by the two professors at the universities of Pakistan.

6.2. Piolet testing & results

Initially, data from 55 respondents were received for conducting pilot testing; these respondents belong to four provinces of the country on which reliability and validity tests have been completed. To determine the reliability and validity of the questionnaire, Cronbach's Alpha and Pearson correlations are executed, for which detail is discussed as follows.

6.2.1. Reliability

Reliability is the measure of the internal consistency of the construct in the study. A construct is reliable if its Alpha (α) value is more significant than 0.70 (Hair, et al, 2013). Consider reliability was assessed using Cronbach's Alpha. The result revealed that the Behavior intention scale with five items (α =.923), Perceived Usefulness with six items (α =.864), Perceived Ease of Use with six items (α =.886), Cost Use with five items (α =.886), System Quality Use with five items (α =.909), Application Complexity Use with five items (α =.899), Social influence with five items (α =.860), Facilitating Conditions with five items (α =.799), Covid-19 effect with five items (α =.838), and Student learning motivation with four items (α =.725). Reliability results are summarized in the table.2

Table 2: Reliability Statistics

Constructs	No. of Items	Alpha (α)
Behavior intention	5	.923
Perceived Usefulness	6	.864
Perceived Ease of Use	5	.886

Cost	4	.886
System Quality	5	.909
Application Complexity	5	.899
Social Influence	5	.860
Facilitating Conditions	5	.799
Covid-19 affect	5	.838
Student learning Motivation	4	.725

6.2.2. Validity

	BI	PU	PE	SQ	COST	APC	COVID	SI	FC	SLM
BI	1									
PU	.410**	1								
PE	.385**	.824**	1							
SQ	.308*	.816**	.790**	1						
COST	-0.01	0.05	0.136	0.133	1					
APC	.578**	.599**	.686**	.736**	0.155	1				
COVID	.326*	0.254	0.17	0.202	.665**	0.207	1			
SI	.594**	.605**	.585**	.476*	0.175	.509*	.414**	1		
FC	.503**	.658**	.673**	.568*	0.112	.539*	0.166	.541	1	
SLM	.557**	.536**	.517**	.506*	0.168	.632*	0.259	.511	.656**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Fig.7. Pearson correlations between Latent Factors

Validity is the accuracy of the measure. For this study, a bivariant correlation test has been conducted in the form of the correlation matrix, which shows the significant relation n (p < .01) among all the constructs except cost, table three indicates the detailed results of the tests. The correlation coefficient (r) value between SLM and other variables is positive except for cost and covid having (r) value (.168, .259) which shows a negligible correlation with SLM. The correlation coefficient (r) value between FC and other variables is positive except for cost and covid having (r) value (.112, .116) which shows a negligible correlation with FC. The correlation coefficient (r) value between other SI variables is positive except for cost having (r) value (.175) which shows a negligible correlation with SI. The variable covid does not have any direct positive or negative correlation with any variable as it is a moderating variable. Application complexity (APC) has a positive correlation with other variables except for cost having (r) value (.155) which shows a negligible correlation with APC. The cost has either negative or has no correlation ship with other variables. System quality has a positive correlation ship with other variables.

7. CONCLUSION AND FUTURE WORK

In the epidemic situation of covid-19, eLearning usage has increased around the globe as social distancing was mandatory. This rapid transformation in the institutions diverts the researcher's focus to investigating the user's behavior for the acceptance of new systems. The world is divided into different regions, and each area has its own environment, culture, and development progress concerning GDP, infrastructure, and related aspects. Researchers are trying to find the essential factors creating hindrances to acceptance/adaptation in eLearning. The findings suggest that eLearning has many advantages, especially in covid-19-like situations, but with several problems, particularly in developing countries like Pakistan, which need immediate attention to investigate so the acceptance of eLearning can be improved.

The sole purpose of this study is to find the essential factors that influenced the slow acceptance of eLearning throughout the covid-19 situation in Pakistan using well-known social psychological models and theories such as M&D, IDT, TAM, and UTAUT. The outcomes of this work can help to formulate the policies by the government and higher education institutions to tackle the covid-19-like situation smoothly in the future. From the initial pilot testing results provided in Tables 2 and 3, the questionnaire tool is appropriate for the research, and there is a significant positive relationship among all selected variables/constructs in the framework except cost and covid as the covid variables act as moderating variables in the framework.

The future work for this study is to test the model fit through structure equitation modeling and other statical tests. The researcher must also prove the hypothesis and provide recommendations for improving the eLearning-related problems in Pakistan.

In several studies, researchers introduce the traditional modeling language constructs. Frequently, these languages' mathematical support and reliability are expected for established (but typically need to be delivered). This side needs consideration, as mathematical support is the basis of any proper method.

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