Original Research Article

Application of Technology Acceptance Model in Examining Students' Behavioural Intention to Use Virtual Meeting Technology: A Partial Least Squares Structural Equation Modeling Approach.

Abstract

The use of virtual meeting technologiesis becoming widespread in the educational field especially due to the outbreak of the Coronavirus Disease (COVID-19) that suddenly traumatized educational institutions activities in many countries across the world. However, despite the numerous advantages of virtual meeting technology, many higher institutions in Nigeria have not embraced the technology even during COVID-19 pandemic due to poor internet connectivity, poor facilities, negative attitudes (non-acceptance) of both teachers and students etc. In this study, partial least squares structural equation modelling (PLS-SEM) based on Davis (1989) technology acceptance model (TAM) was used to test the proposed model. The reliability and validity tests of the data collection instrument re-established the suitability of the TAM model in measuring the students' acceptance of virtual meeting technologies. The research indicated that perceived usefulness as established by (Davis, 1989) was also found to have a significant impact on students' attitude and behavioral intention to use virtual meeting technology. Similarly, the result has shown that perceived ease of use (PEOU) had a strong effect on perceived usefulness (PU).

Keywords: Technology Acceptance Model (TAM), Structural equation modelling (SEM), Partial Least Squares (PLS), Virtual Meeting Technology, Coronavirus Disease (COVID-19).

1. Introduction

User acceptance of technology has been an interesting area which attracted the attention of many scholars for over two decades now. Though many models have been offered to describe and predict the use of a system, the Technology Acceptance Model (TAM) has widely captured the attention of most researchers interested in studying user acceptance of technology due to its popularity, flexibility, and effectiveness in examining the use of e-learning systems.

The outbreak of the Coronavirus Disease (COVID-19) has traumatized educational institutions activities inmany countries across the world. COVID-19 was declared a pandemic by the World Health Organization (WHO) on the 11th March 2020 (Francesco et al., 2020).Various countries have implemented social distancing policies intended to reduce social interactions amongst people. Nigeria like many other countries unexpectedly implemented policies of learning from home, working from home, and worshiping at home. As it stands today, virtual learning has come to stay as many schools reopens online academic calendar after the covid-19 pandemic lockdown globally (Olatunde et al., 2021). In response to this lockdown directive in year 2020 by different countries across the World, many universities have switched to online education (Olabisi, 2020). Utilization of virtual meeting technology in university globally has been considered as a key factor in ensuring effective teaching and learning (Roy *et al.*, 2020). Despite the numerous advantages of virtual meeting technology, many higher institutions in Nigeria have not embraced the technology even during COVID-19 pandemic due to poor internet connectivity, poor facilities, negative attitudes (non-acceptance) of both teachers and students etc.

Structural Equation Modeling (SEM) is frequently used to describe multiple statistical relationships simultaneously through visualization and model validation. It is an extension of traditional linear modeling techniques, e. g., multiple regression analysis and Analysis of Variance (ANOVA). In summary, it combines factor and multiple regression analyses simultaneously (Sarstedt et al., 2017; Hair et al., 2017).In Factor analysis, the variables are grouped by their correlations which are assumed to be more correlated within a group than in a different group. Then it can be said that each group of variables represents a single underlying construct (or factor) that is responsible for the observed correlations (Suleiman et al., 2019). SEM examines the relationship between latent constructs (factors) that are generally indicated by various measures. It provides a single complex model that includes various dependence and interdependence relationships among the constructs; The covariance between the observed variables can be obtained through this method with detailed analysis of various covariance statistics, e.g., mean, standard deviation, etc.; Recently, the PLS approach has been quite common among researchers because of its variance based relationship rather than covariance (Mueller & Hancock, 2018). It has advantages over the traditional multivariate techniques that only answers individual objectives; It is also used to validateother models when it comes to finding the most appropriate relationship among the latent variables.

Mugo et al., (2017) considered the Technology Acceptance Model (TAM) and its Application to the Utilization of Mobile Learning Technologies. They explained how the TAM model can be incorporated in to SEM to predict the acceptance and utilization of numerous technologies in teaching and learning processes. The research analyzed virtual electronically stored documents for access through the internet, text books, archival repositories as well as encyclopedia. The

results discovered that mobile technologies have continued to receive acceptance as valuable resources for all educational practices despite attitudinal and technical challenges.

Liao et al., (2018) explored Users' Behavioral Intention to Adopt a Performance Assessment System for E-book Production via Technology Acceptance Model (TAM). The web-baedperformance assessment system containing 35 questions regarding four dimensions of full-text e-book production was introduced. They used structural equation model to examine the hypotheses and relationships in the research to verify external effects of "computer self-efficacy". This research revealed that the technology acceptance model can explain users' willingness to adopt a web-based assessment system.

Almulla (2021) used technology acceptance model (TAM) to evaluate e-learning system use for education sustainability. He looked at an updated TAM paradigm with seven constructs that include computer self-efficacy, subjective norm, perceived enjoyment, perceived usefulness, perceived ease of use, attitude towards use, and behavioral intention to use e-learning system for education sustainabilityin order to examine students' adoption of e-learning in Saudi university.A random sample of size 174 university students were selected using stratified random sampling. Structural equation modeling (SEM) results revealed that Computer self-efficacy (CSE), subjective norm (SN), and perceived enjoyment (PE) were found significant determinants of perceived ease of use (PEU) and perceived usefulness (PU). Students' intentions to use an e-learning system for educational sustainability were influenced by PEU, PU, and attitudes toward use.

Rini and Khasanah (2021) applied technology acceptance model to evaluate the intention to use online meeting technologies within COVID-19 pandemic. Samples of size 186 were randomly selected and the respondents' dataobtained using the questionnaire instrument were tested for

validity and reliability and analyzed using the Structural Equation Model. Based on the results, it was revealed that all hypotheses in this research were accepted. It also indicated that perceived ease of use has more influence on the intention to use online meeting applications than perceived risk. The research recommended that developing companies should focus on perceived ease of use of their online technology in order to increase its acceptance by users.

Bailey et al (2022) used the technology acceptance model (TAM) to describe how the use of technology effects learning outcomes originating from meeting with the Zoom video conference platform. Structural equation modeling was used to examine the relationships among the TAM variables in reference to Zoom taught during the Covid-19 pandemic. Using a cross-sectional research design, data were collected using Davis's TAM (1989) scales including perceived ease of use (PEoU), perceived usefulness (PU), behavioral intentions, and attitude from 321 South Korean university students attending their 10^{th} week of English as a foreign language (EFL) conversational English classes. Results revealed that seven of the ten proposed hypotheses were established, with path coefficients indicating small to large effect sizes. Most notably, Perceived Ease of Use with Zoom had high significant effect on Perceived Usefulness and actual use.

2. Method

2.1 Research Design and Procedure

The study used descriptive research design. A questionnaire was developed and statements regarding to respondents' demographic characteristics such as gender, age etc., as well as several questions or statements measure in Likert scale for technology acceptance model (TAM) attributes were included. A minimum random sample of size 2,091 was computed from the population of 26,933 students in Federal Univeristy, Dutisn-Ma, Katsina State, Nigeria, using

single stage cluster sampling technique considering each faculty of the University as the cluster and the Krejcie and Morgan (1970), method of calculating sample size for a finite known population. However, 2,500 copies of questionnaires were randomly administered to students from the selected faculties based on their respectively sample sizes and out of which 2,264 were properly retrieved. The questionnaire was validated by experts, pilot testing procedures.

Data from students' respondents were processed and analyzed using SmartPLS 3 and IBM SPSS statistics 21. Partial Least Squares Structural Model or also called PLS-SEM was used to design structural models (inner models) and design measurement models (outer models) by considering technology acceptance models' attributes.

2.2 Conceptual framework

Five variables or construct models emanating from the technology acceptance model (TAM) due to (Davis,1989) namely perceived ease of use (PEOU), perceived usefulness (PU), Attitude towards using (ATU), behavioral intention of use (BI) and Actual System use (AU) were conceptually considered in the designing this study. Figure 1 depicts the relationship among constructs.

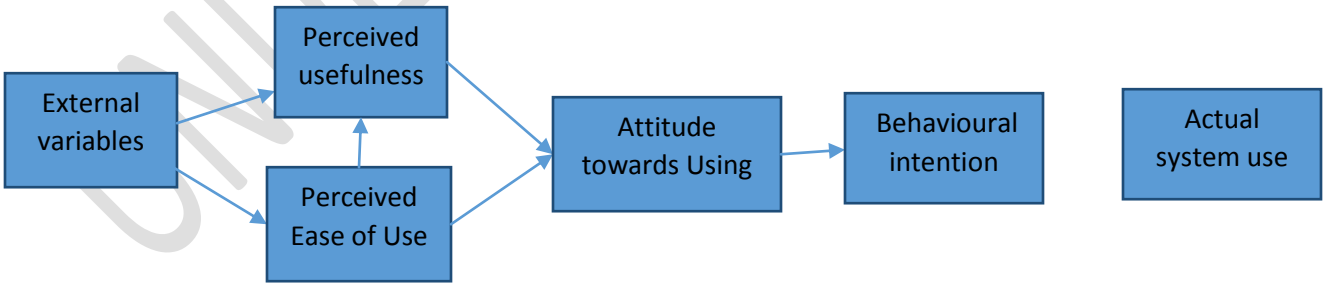

Figure 1: Conceptual Model Framework (Davis, 1989)

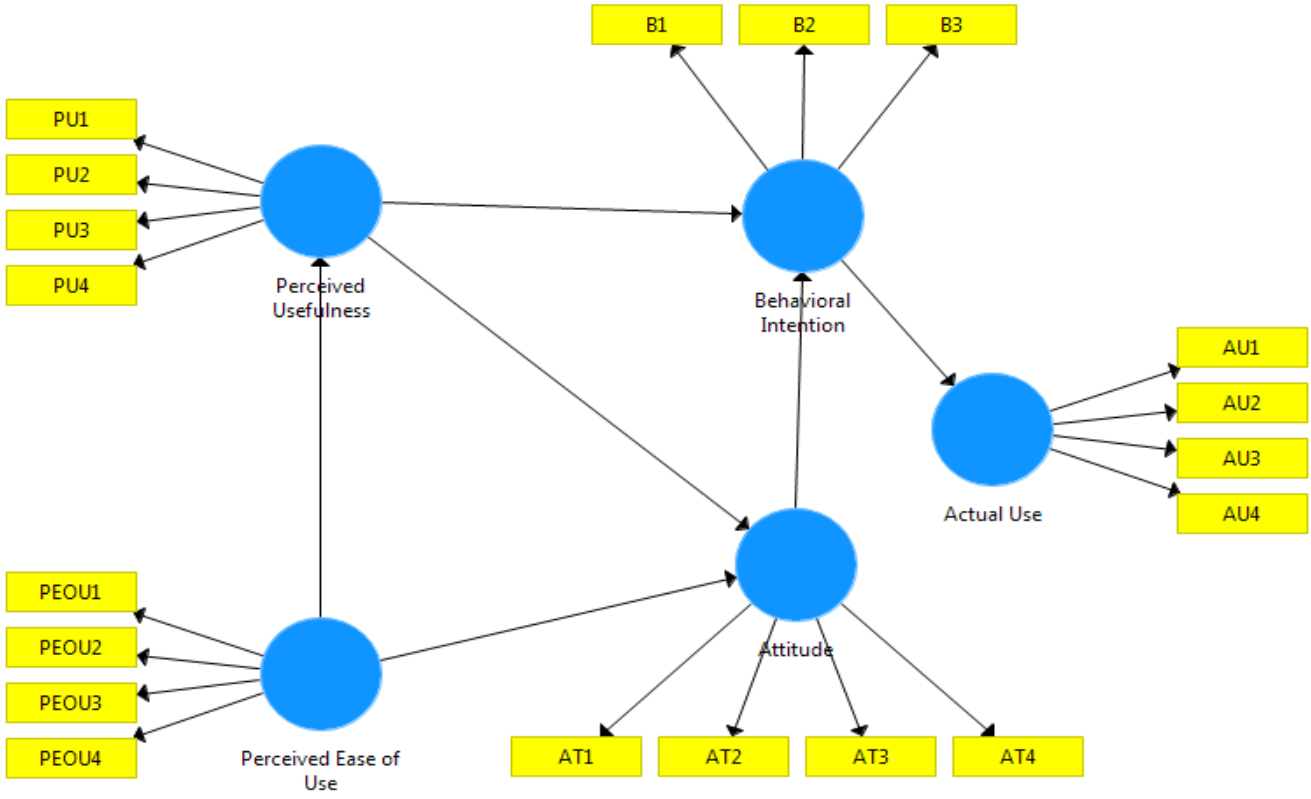

Figure 2: Path Diagram

The relationship of the variables in figure 1 clearly indicates that there are six related hypotheses namely:H_{01}: Perceived ease of use (PEOU) does not have significant effect on the students' attitude towards virtual meeting technology.H_{02}: Perceived usefulness (PU) does not have significant effect on the students' attitude towards virtual meeting technology.H_{03}: Perceived usefulness (PU) does not have significant effect on students' behavioral intention to use virtual meeting technology. H_{04}: Students' attitude towards virtual meeting technology does not have significant effect their on behavioral intention to use virtual meeting technology. H_{05}: Behavioral Intention (BI) does not have significant effect on students' actual use of the virtual meeting technology.H_{06}: Perceived ease of use (PEOU) does not have significant effect on perceived usefulness (PU) of virtual meeting technology. The structural model based on the conceptual

mode is depicted in figure 2 above. Thus, the linear regression model can be formulated based on figure 2 as:

$$PU = k_0 + b_1 PEOU \quad (1)$$

$$AT = k_1 + b_2 PU + c_2 PEOU \quad (2)$$

$$BI = k_2 + b_3 PU + c_3 AT \quad (3)$$

$$AU = k_3 + b_4 BI \quad (4)$$

Where PU, AT, BI and AU represent linear regression equation. k_0, k_1, k_2 *and* k_3 represent intercepts for PU, AT, BI and AU respectively. b_1 represents partial regression coefficient of PEOU. b_2 represents partial regression coefficient of PU. c_2 represents partial regression coefficient of PEOU. b_3 represents partial regression coefficient of PU. c_3 represents partial regression coefficient of AT. b_4 represents partial regression coefficient of BI.

3. Results and Discussion

3.1 Respondents' demographic profile

Table 1 depicts demographic profile of 2,264 respondents. Respondents' gender distribution indicates that 1,143(50.5%) are male and 1,121(49.5%) are female. The age distribution of the students' respondent shows that 421(18.6%), 917(40.5%), 652(28.8%), 265(11.7%) and 09(0.4%) aged less than 21 years, 21 to 30 years, 31 to 40 years, 41 to 50 years and 50 to 60 years respectively. In terms of computer skills, 851 (37.6%), 1044(46.1%) and 369(16.3%) respondents are novice, moderate and expert respectively. In terms of internet skills, 317 (14.0%), 1130(49.9%) and 817(36.1%) respondents are novice, moderate and expert respectively.

Table 1: **Socio-Demographic Characteristics of Patients**

Gender	**Frequency**	**Percentage (%)**
Male	1,143	50.5
Female	1,121	49.5
Total	2,264	100.0
Age	**Frequency**	**Percentage (%)**
≤ 21	421	18.6
21-30	917	40.5
31-40	652	28.8
41-50	265	11.7
51-60	09	0.4
Total	2,264	100.0
How do you rate your computer skills	**Frequency**	**Percentage (%)**
Novice	851	37.6
Moderate	1,044	46.1
Expert	369	16.3
Total	2,264	100.0
How do you rate your internet skills	**Frequency**	**Percentage (%)**
Novice	317	14.0
Moderate	1,130	49.9
Expert	817	36.1
Total	2,264	100.0

3.2 Outer Model Analysis

Table 2 shows the outer loadings factor for the measurement model. It indicates whether an item should be retained or not. An item is retained if its outer loadings factor is≥ 0.5(Hair et al., 1998; Adeniran et al., 2022) ≥ 0.6(Suleiman and Yasir 2022a; Zheng and Li 2020). Therefore the results in table 2 indicates that the loading factor value of each variable in this research model ranges from 0.796 to 0.982 indicating that all the variables should be retained.

Table 2: **Outer Loadings Factor**

Indicator	Loading factor	Results	Indicator	Loading factor	Results
PU1	0.972	Retained	BI3	0.849	Retained
PU2	0.905	Retained	AT1	0.855	Retained
PU3	0.982	Retained	AT2	0.868	Retained
PU4	0.979	Retained	AT3	0.796	Retained
PEOU1	0.961	Retained	AT4	0.950	Retained
PEOU2	0.964	Retained	AU1	0.864	Retained
PEOU3	0.982	Retained	AU2	0.931	Retained
BI1	0.923	Retained	AU3	0.887	Retained
BI2	0.961	Retained	AU4	0.943	Retained

Table 3 presents average variance extracted (AVE) for each construct. The model validity can be established using AVE (Fornell and Larcker, 1981). The construct is declared valid if it's AVE≥ 0.5 (Suleiman and Yasir 2022b; Zheng and Li 2020). In this study, the AVE value for each construct as shown in Table 3 happens to be ≥ 0.5. Hence, each construct value is valid.

Table 3: Average Variance Extracted

Construct	AVE	Result
Perceived usefulness (PU)	0.922	Valid
Perceived Ease of Use (PEOU)	0.939	Valid
Behavioral Intention (BI)	0.832	Valid
Students' attitude (AT)	0.756	Valid
Actual use (AU)	0.822	Valid

Table 4 presents discriminant validity. In this study, the discriminant validity is established since the correlation for construct is higher than its correlation with other constructs (Hulland, 1999; Suleiman and Yasir 2022b)

Table 4: Discriminant Validity

Latent Variable	**PU**	**PEOU**	**BI**	**AT**	**AU**
Perceived usefulness	**0.960**				
Perceived Ease of Use	0.786	**0.969**			
Behavioral Intention	0.784	0.799	**0.912**		
Students' attitude	0.873	0.672	0.818	**0.869**	
Actual Use	0.105	0.088	0.218	0.168	**0.902**

The reliability is used to test the consistency of the answers obtained from respondents. The values of composite reliability and Cronbach alpha can be used to established reliability of a model. In this study, Cronbatch reliability value of all constructs in Table 5 happens to be >= 0.7 (Burodo et al., 2021; Suleiman and Usman, 2016). Thus, each construct has an acceptable consistency.

Table 5: Average Variance Extracted

Construct	Composite reliability	Cronbatch Alpha
Perceived usefulness (PU)	0.979	0.971
Perceived Ease of Use (PEOU)	0.979	0.967
Behavioral Intention (BI)	0.937	0.898
Students' attitude (AT)	0.925	0.890
Actual use (AU)	0.949	0.928

3.3 Inner Model Analysis

Hypothesis testing is carried out by investigating the structural model using T-Statistics value to findout the significant of the relationship (path)between the constructs on the proposed model. Table 6, the effect of perceived ease of use on students' attitude (H_{01}) ($\beta = 0.424$, $T= 8.712$, $p <0.001$), thus, hypothesis 1 was rejected. Next hypothesis which tests the effect of perceived

usefulness on students' attitude ((H_{02})) (β = 0.559, T= 11.345, p <0.001) thus, the second hypothesis was rejected. The hypothesis 3 examines the effect of perceived usefulness on students' behavioral intention (H_{03}) (β = 0.702, T= 9.841, p <0.001), thus, the hypothesis was rejected. Also, the relationship between students' attitude and students' behavioral intention was investigated in hypothesis 4 (H_{04}) (β = 0.292, T= 3.996, p <0.001), thus, the hypothesis was rejected. Next hypothesis 5 which assessed the relationship between students' behavioral intention and students'' actual use of the technology (H_{05}) (β = 0.931, T= 75.863, p <0.001), thus, hypothesis was rejected. Finally, the effect of Perceived Ease of Use on Perceived Usefulness ((H_{05})) (β = 0.946, T= 134.770, p <0.001), thus, hypothesis was rejected.The results of the path coefficients findings are also presented in Figure 3.

Table 6: Path coefficients

Path and Hypothesis	Coefficients	t-statistics	P-values
Perceived ease of use ->Attitude (H_{01})	0.424	8.712	0.000^{***}
Perceived Usefulness ->Attitude (H_{02})	0.559	11.345	0.000^{***}
Perceived Usefulness->Behavioral intention (H_{03})	0.702	9.841	0.000^{***}
Attitude -> Behavioral intention (H_{04})	0.292	3.996	0.000^{***}
Behavioral intention -> Actual Use (H_{05})	0.931	75.863	0.000^{***}
Perceived ease of use ->Perceived Usefulness (H_{06})	0.946	134.770	0.000^{***}

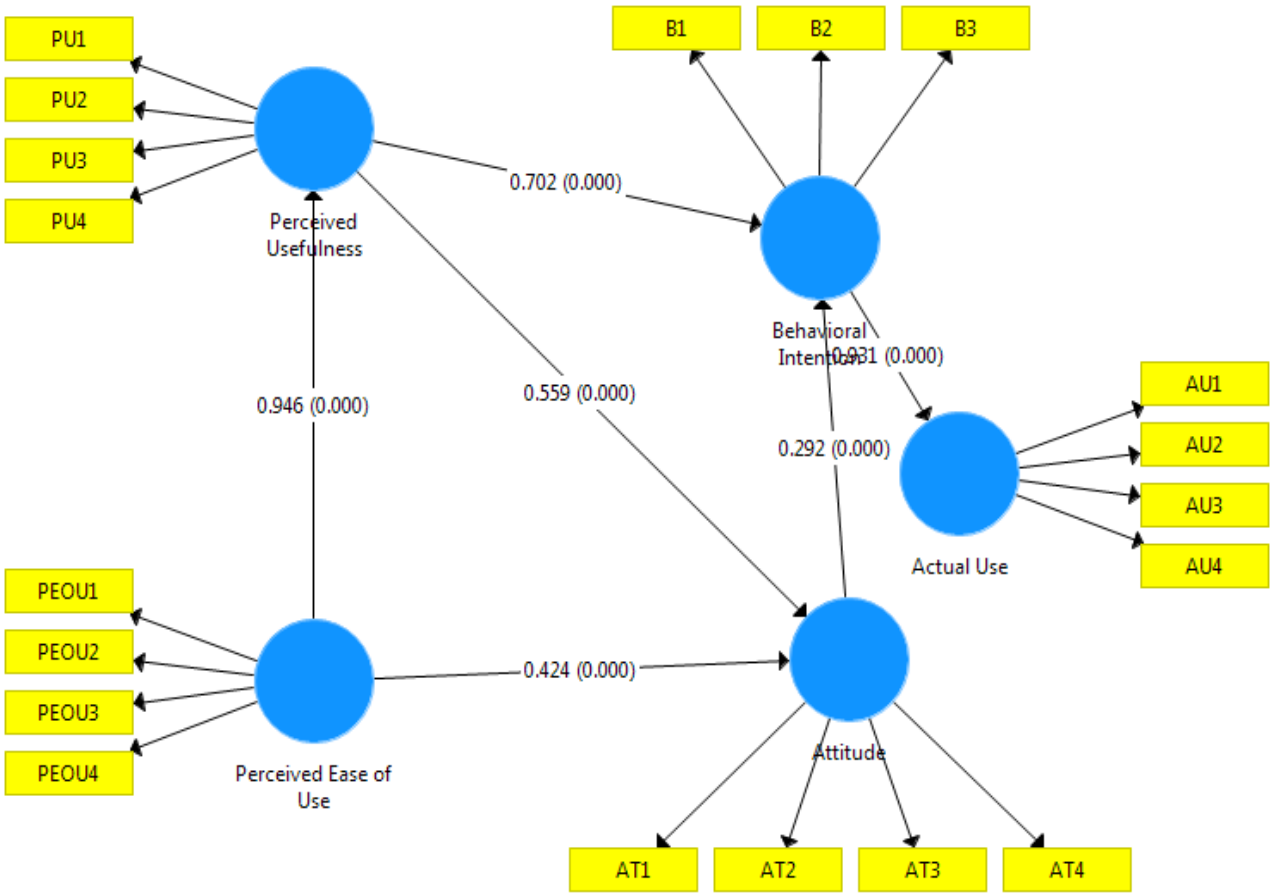

Figure 3: Path coefficients P-values

4. Conclusion

This study examined if the technology acceptance model (TAM) could validly be used to determine relationship between perceived ease of use (PEOU), perceived usefulness (PU), attitude (AT), behavioral intention (BI) and actual use (AU) of virtual meeting technology using students' sample at Federal University Dutsin-Ma, Katsina State, Nigeria. Results indicated that students' actual use of the technology was significantly determined by their attitudes and behavioral intention to use virtual meeting technology. Perceived usefulness as established by (Davis, 1989) was also found to have a significant impact on students' attitude and behavioral intention to use virtual meeting technology. This finding is consistent with the claim of Masrom (2007) who recommends that an individual intention to use a technology is determined by

positive perception of the technology's usefulness. Furthermore, the result of this research also showed that perceived ease of use (PEOU) had a strong effect on perceived usefulness (PU). This means that providing proper user training is fundamental for improving users' perception of the usefulness of a new technology. The results of this research has established that technology acceptance model (TAM) can be genuinely used to explain students' adoption of virtual meeting technology.

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