INVESTIGATING THE ACCEPTANCE OF VIRTUAL LEARNING ENVIRONMENT (VLE) IN THE HIGHER EDUCATION INSTITUTES OF CHINA

Sarah Safdar[1*], Minglun Ren[1], Muhammad Adnan Zahid Chudhery[2].
[1] School of Management, Hefei University of Technology, Hefei, Anhui, 230009, China. Email: safdar.sarah@yahoo.com
[2] School of Economics and Management, Tongji University, Shanghai, 200092, China.

ABSTRACT: *Virtual learning environment (VLE) has become an essential part of quality education. Therefore, this study aims to investigate the acceptance of VLE using pull and mooring factors in the Chinese higher education institutes. The data got collected using a structured questionnaire from 260 university students of various disciplines, out of which 205 were found valid and used in this study. Smart-PLS was employed to conduct the analysis. This study provides significant theoretical as well as practical implications.*

Keywords: Virtual learning environment (VLE); distance learning; e-learning; technology acceptance.

1. INTRODUCTION

The internet has played a dramatic role in changing the traditional learning system [1]. A swift change in the teaching approach can be seen as a significant number of teachers have adopted information technology to assist them in teaching [2]. As a result, the students can get online learning opportunities [1]. A significant number of studies have argued that e-learning has started considering as a useful tool for teaching and learning [3]. E-learning defined as a virtual learning environment that helps to improve the individual's learning process [4]. E-learning helps to integrate various instructional materials including text files (i.e., presentations, assignments, data files, etc.), media files (i.e., audio, video, animated files), online discussion groups, blogs, and online video conversations, etc. [3, 4].

Virtual learning environment (VLE), an e-learning platform, started to be considered as an essential aspect of teaching and learning process [3] that makes it possible to teach and learn across geographical borders by providing face-to-face conversation opportunity without a physical presence [4]. This study has an aim to investigate the acceptance of VLE among Chinese students using pull and mooring factors with technology acceptance model (TAM).

2. LITERATURE REVIEW

We reviewed a few studies conducted in Taiwan. The first one revealed that the system functionality in addition to the constructs of TAM strongly influences to adopt e-learning as compared to other variables [3]. The second one explored the influencing factors for the online learning community and extended TAM with four additional explanatory variables related to the designing of courses along with interface, and the learning experience [2]. All of the proposed hypotheses were supported. Another study conducted in Spain investigated motivational factors behind student's satisfaction and dissatisfaction to use web-based learning platform [5].

We also reviewed various studies conducted in China. The first one conducted to evaluate the acceptance and usage of VLE by Chinese students [4]. In this study, perceived usefulness was found as a direct influencing factor in contrast with perceived ease of use and the subjective norms that were found having an indirect effect through perceived usefulness. The second one examined the motivational perspective for online learning [6] and employed enjoyment with TAM. The third one considered e-learning adoption as an innovation in the education sector rather than an IT technology [7]. The study concluded perceived compatibility as an influencing factor for the likelihood of students' e-learning in contrast with trial-ability as having a negative influence on e-learning adoption.

Based on the above discussion, it was explored that these studies have not been incorporated pull and mooring factors to examine the acceptance of VLE in the Chinese context. Therefore, we are combining perceived usefulness and omnipresence as pull factors, while expected switching cost as mooring factor with TAM to examine the acceptance of VLE in the Chinese context.

3. THEORETICAL MODEL AND HYPOTHESIS

3.1. Technology Acceptance Model

The TAM has been employed to analyze people's acceptance towards technology such as virtual learning environment [4, 5], e-government adoption [8], and the e-commerce [9, 10]. Figure 1 demonstrates the proposed research model.

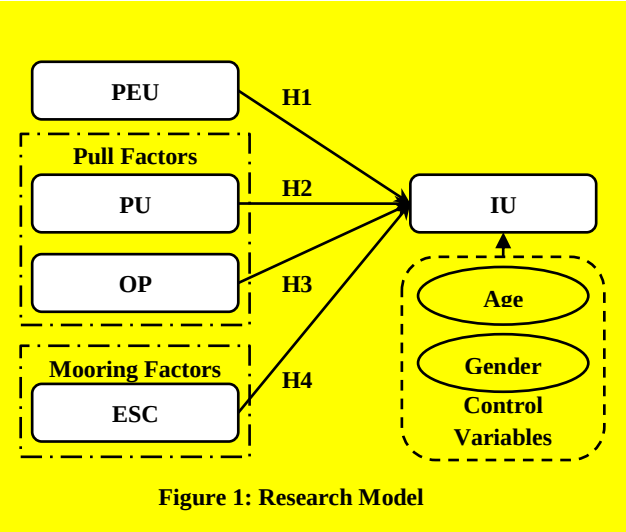

Figure 1: Research Model

3.2. Hypothesis Development

Perceived ease of use (PEU) is referred to in this study as the students consider using VLE will be easy for them [11]. PEU has been studied well and found a significant influencing factor in adopting a new technology such as virtual learning environment [2, 3, 5, 12, and 13], mobile learning [4], smartphone technologies [14], and online banking [15], etc. Hence, we propose:

H1: Perceived ease of use positively influences VLE usage intention in the higher education institutes of China.

Pull factors are defined as attracting factors for end-users to adopt VLE [16]. After reviewing VLE related studies, pull

factors were found salient to VLE adoption, therefore perceived usefulness and omnipresence got incorporated. Perceived usefulness (PU) is referred to in this study as the students consider VLE as a useful instrument to enhance learning capabilities [17]. PU has been studied well and found a significant influencing factor in adopting a new technology such as e-learning [3], mobile learning [18], and e-ticketing [19], etc. Therefore, we propose:

H2: Perceived usefulness positively influence intention to use VLE in the higher education institutes of China.

The prime attraction of cloud computing is the anytime/ anywhere access characteristics [16], therefore defined as omnipresence. VLE makes the students able to share and access learning material quickly without any location or time constraint using their computers or laptops. As a result, omnipresence enhances end-users' intention to adopt VLE. Hence, we hypothesize:

H3: Omnipresence positively influences intention to use VLE in the higher education institutes of China.

Mooring factors defined as obstacles that intervene end-users' adoption behaviors [16]; therefore expected switching cost is incorporated. Expected switching cost is the perceived challenges in switching from getting traditional learning support to VLE. Specific to our research context, switching cost defined as a negative perception in term of irrecoverable time, unexpected hassles, and the loss of learning material. Therefore, an increase in switching cost will lead to decrease the intention to switch to VLE, while assuming VLE as a better substitute. So, we hypothesize;

H4: Expected switching costs have a negative impact on students' intention to switch to VLE in the higher education institutes of China.

4. METHOD

4.1. Research Setting, Questionnaire Design and Data Collection

This study conducted during March-August 2018 in the Hefei University of Technology (HFUT), located in the city of Hefei, Anhui province of China. All of the constructs were adapted from existing literature with minor changes. A 5-point Likert scale (strongly disagree = 1 to strongly agree = 5) was employed. Table 1 demonstrates the sources of constructs and the measures. After employing a back-translation approach, a pilot study got conducted to validate the survey instrument, in which 23 Chinese students participated. Later, the revised questionnaires were distributed among 260 students of HFUT, while 235 were received. Out of which 30 were incomplete, therefore, excluded resulting in a final sample consisting of 205 valid responses. Non-response bias was not found.

4.2. Data Analysis

The common method bias testing was done using SPSS v.20. Later, we employed structural equation modeling (SEM) using partial least squares (PLS) estimation to test the measurement and structural model. Therefore, Smart-PLS (v.3.2.7) software was employed in this study to examine the measurement along with the structural model. Table 2 demonstrates demographic information.

Table 1: Survey questionnaire items

Constructs and measures	Source
Perceived Usefulness (PU) PU1 – PU4	[20]
Perceived Ease of Use (PEU) PEU1 – PEU2	[20], [21]
Expected Switching Cost (ESC) ESC1 – ESC3	[22]
Omnipresence (OP) OP1 – OP4	[16]
Intention to Use (IU) IU1 – IU3	[20]

Table 2: Demographic information

Descriptions		Frequency	Percentage
Gender	Male	107	52.2
	Female	98	47.8
Age	≤ 20	52	25.4
	21 – 30 years	146	71.2
	31 – 40 years	5	2.4
	≥ 41	2	1
Educational Qualification	PhD	17	8.3
	Master	60	29.3
	Bachelor	128	62.4
	Others	0	0
IT Experience	≤ 1	6	2.9
	2 – 4 years	50	24.4
	5 – 7 years	65	31.7
	8 – 10 years	51	24.9
	≥ 11	33	16.1

5. RESULTS

5.1. Common Method Bias

The common method bias is known as a threat in the validation of research results; therefore, single factor analysis got employed [23]. The common method bias should not be an issue if the single factor is higher than 50% of the variance [24]. In this study, the first factor demonstrates 36.855% of the variance. Therefore the common method is not a concern in this study.

5.2. Measurement Model

The measurement model examined using convergent and discriminant validities. The value of factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE) were considered to assess the convergent validity. The factor loadings above 0.50 are considered satisfactory [25]. The composite reliability and the Cronbach's alpha above 0.70 are considered satisfactory, whereas the AVE equals or higher than 0.50 is considered satisfactory [26–29]. Table 3 is evidence of good convergent validity as the values for Cronbach's alpha are between 0.738 and 0.848, composite reliability is between 0.850 and 0.908, and the AVE is between 0.616 and 0.767.

The discriminant validity determines that the construct measures are dissimilar with others [30]. The discriminant validity examined using two approaches [31]. Firstly, the square root of the AVE was found higher than the correlation with other constructs [32]. Table 4 is evidence of good discriminant validity.

Secondly, the cross-loading was examined in table 5. Item loading for OP4 was less than 0.70, that's why not incorporated in the analysis. We found that the item loadings were higher than the cross-loadings of other latent variables, therefore, concluded as having good discriminant validity.

Table 3: Convergent validity

	Cronbach's Alpha	CR	AVE
Expected Switching Cost	0.738	0.850	0.655
Intention to Use	0.848	0.908	0.767
Omnipresence	0.761	0.862	0.676
Perceived Ease of Use	0.827	0.883	0.655
Perceived Usefulness	0.791	0.865	0.616

CR Composite Reliability; *AVE* Average Variance Extracted.

Table 4: Discriminant validity

	ESC	IU	OP	PEU	PU
ESC	**0.809**				
IU	0.492	**0.876**			
OP	0.445	0.534	**0.822**		
PEU	0.356	0.435	0.391	**0.809**	
PU	0.263	0.500	0.383	0.524	**0.785**

ESC Expected Switching Cost; *IU* Intention to Use; *OP* Omnipresence; *PEU* Perceived Ease of Use; *PU* Perceived Usefulness.

Table 5: Cross-loading Matrix

	ESC	IU	OP	PEU	PU
ESC1	**0.867**	0.468	0.418	0.333	0.316
ESC2	**0.841**	0.405	0.347	0.229	0.134
ESC3	**0.711**	0.298	0.303	0.310	0.170
IU1	0.439	**0.861**	0.470	0.360	0.395
IU2	0.399	**0.893**	0.468	0.385	0.482
IU3	0.455	**0.873**	0.466	0.397	0.434
OP1	0.390	0.498	**0.858**	0.302	0.314
OP2	0.401	0.375	**0.765**	0.308	0.274
OP3	0.313	0.432	**0.840**	0.361	0.356
PEU1	0.195	0.212	0.292	**0.720**	0.432
PEU2	0.295	0.369	0.275	**0.833**	0.416
PEU3	0.358	0.420	0.326	**0.878**	0.466
PEU4	0.268	0.357	0.381	**0.798**	0.398
PU1	0.189	0.382	0.341	0.313	**0.765**
PU2	0.255	0.442	0.335	0.446	**0.862**
PU3	0.205	0.365	0.284	0.472	**0.786**
PU4	0.171	0.374	0.239	0.414	**0.720**

We examined multicollinearity using the variance inflation factor (VIF), or the tolerance values that are required to be less than 10, or greater than 0.1 respectively [33]. The VIF values in our study are ranging from 1.326 to 2.271. Hence, the multicollinearity is not a concern in our study.

5.3. Structural Model and Hypothesis Testing

Smart-PLS (v. 3.2.7) was employed to test the hypothesized relationships after validating the measurement model. Hypothesis testing was done by applying a bootstrapping method. Table 6 explains the results of the analysis performed using Smart-PLS. The results indicate that perceived ease of use ($\beta = 0.087$, $t = 0.978$) has no positive influence on the usage intention. Therefore, H1 is not supported. Perceived usefulness ($\beta = 0.279$, $t = 3.074$) positively affects the usage intention, thus, supporting H2. Omnipresence ($\beta = 0.275$, $t = 3.553$) positively affects the usage intention, thus, supporting H3. Expected switching cost ($\beta = 0.265$, $t = 2.946$) negatively impacts the usage intention, thus, supporting H4. Age ($\beta = 0.008$, $t = 0.149$) and gender ($\beta = -0.037$, $t = 0.721$) were considered as control variables, and not found significant to intention to use.

Table 6: Results of the research model

	β	*t*-statistics	P Values	Comments
PEU -> IU	0.087	0.978	0.328	Not Supported
PU -> IU	0.279	3.074	0.002	Supported
OP -> IU	0.275	3.553	0.000	Supported
ESC -> IU	0.265	2.946	0.003	Supported
R^2	0.455			

6. DISCUSSION AND CONCLUSION

Based on TAM, this study investigated the influencing factors in the adoption of the virtual learning environment in the Chinese higher education institutes and revealed various interesting findings. Perceived ease of use was not found a significant factor in the VLE adoption. Whereas, perceived usefulness and omnipresence were found significantly influencing factors in the adoption of VLE in Chinese higher education institutes. Expected switching cost was found as having a negative impact on students' intention to use VLE in the Chinese higher education institutes. This study has significant theoretical as well as practical implications. For theoretical implications, the study is addressing factors influencing the adoption of VLE. This study is extending TAM with pull and mooring factors. For practical implications, the study is providing a guideline to strengthen and secure the virtual learning environment so that expected switching cost might get minimized.

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