

Factors Influencing the Students' Use of Learning Management Systems: A Case Study of King Abdulaziz University

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Abstract: The Technology Acceptance Model (TAM) has been one of the most popular models in explaining the acceptance of technologies and employed empirically in various studies. This study was conducted with the objective of investigating the acceptance and use of the learning management system (LMS) at King Abdulaziz University (KAU) from the perspectives of Saudi students. The study aims to understand the factors that lead to the proper utilization of LMS within the context of Saudi Arabia by examining the associations between the students' actual use of LMS and external variables: prior experience of LMS, satisfaction, social influence, computer self-efficacy and the teacher role. The participants were male and female students at KAU during the 2016 Fall semester in different fields and education levels. This quantitative study used both online and paper-based questionnaires to ensure a sufficient sample size. Based on the non-probability convenience sampling technique, 150 responses were received, and 142 responses were used for data analysis. For estimating the reliability of the instruments, Cronbach's alpha measure was employed. The 14 proposed hypotheses were examined using the regression analysis statistical technique. Findings demonstrate the original TAM hypotheses and show the factors that influence the adaption of LMS within the context of Saudi Arabia. The students' use of LMS is positively influenced by prior experience of LMS, satisfaction, social influence, computer self-efficacy and the teacher role. As TAM has barely been used in understanding the students' actual use of LMS in Saudi Arabia, the findings may provide a roadmap for future work to examine further variables that influence the use of LMS from the perspectives of Saudi students.

Keywords: Technology Acceptance Model, learning management system, King Abdulaziz University, e-learning system.

1. Introduction

With the development in Information and Communication Technologies (ICTs), many technologies have been adopted to enhance the efficiency of learning in higher educational institutions. This has affected the field of education in academic and learning settings in Saudi Arabia (Al-Asmari & Rabb Khan, 2014). E-learning is one of the outcomes of this development and cannot be delivered without the use of technologies. Abazi-Bexheti, et al. (2010) reported that learning management systems (LMS) have been the most popular technology for conducting e-learning. Further, LMS are considered the most commonly used technology in the field of education (Swart, 2016), and this is attributed to the accessibility and flexibility of ICT (Alsaied, 2016). In spite of the massive adoption of LMS by educational institutions, the utilization of such systems is still not within the acceptable levels (Alsaied, 2016).

The structure of the paper is organized as follows: First, the problem statement and motivation for the study is presented, followed by a brief description of the TAM model. After discussing the related work of TAM, there is a methodology section. The study findings are presented prior to the discussion and conclusion section.

2. Problem Statement

LMS have been widely adopted in higher educational institutions internationally (Dahlstrom, et al., 2014). Saudi Arabia is no exception. In the context of Saudi Arabia, the majority of Saudi universities (87%) have adopted LMS where Blackboard is the dominant system (Aljuhney & Murray, 2016). However, the utilization of LMS in Saudi

Arabia is minimal (Alsaied, 2016; Alharbi & Drew, 2014). Therefore, this study aims to explore the acceptance and actual use of LMS within the context of Saudi Arabia. As many studies have concluded that Saudi students use e-learning systems ineffectively (Al-Jarf, 2007), the factors that have an influence on the usage of LMS from Saudi students' perception are investigated. Moreover, the study is not limited to the original TAM constructs, instead some external variables were examined. In addition, insights regarding the recent published literatures in the context of TAM and LMS is provided.

3. Study Motivation

The motivation of the study was derived from different sources. The majority of LMS studies in Saudi Arabia investigated functions of LMS, technical usability and users' attitude toward the system (Alharbi & Drew, 2014). Little research has been conducted to understand the relationship between Saudi students' LMS utilization and external factors. In addition, the recent adoption of LMS at KAU necessitates investigating the acceptance of the system from the students' perspective. Therefore, the original TAM constructs (perceived ease of use, perceived usefulness, attitude toward use and actual use) were examined. Moreover, most studies focus on teachers' perspective rather than students'. Alharbi and Drew (2014) asserted that scholars have ignored using TAM to assess LMS in the context of Saudi Arabia. Therefore, it is not surprising that TAM has barely employed to assess Saudi students' acceptance of LMS. Since students do not use e-learning system effectively (Al-Jarf, 2007), it is necessary to identify the factors that lead to better utilization of LMS. As the acceptance and adoption of LMS face many issues (Al-Busaidi & Al-Shihi, 2010), it is worthwhile to evaluate the acceptance of LMS and investigate factors that influence the usage from students' perception.

4. Technology Acceptance Model

Many models, such as technology acceptance model (TAM), have been used to investigate the acceptance of technologies. TAM is one of the most popular models in understanding the acceptance of technologies and has been used empirically in various studies (Al-Busaidi & Al-Shihi, 2010; Ramirez-Anormaliza, et al., 2016; Shroff, et al., 2011; Yoon, 2016; Mohammadi, 2015). TAM was developed by Fred Davis in 1989 to introduce a theoretical framework based on the theory of reasoned actions (TRA) (Davis, 1989). TAM explains the relationship between users and technologies to estimate the user's acceptance of the technology. The majority of acceptance models have failed to combine the psychological and technical constructs into one theory; however, TAM is one of the theories that combines variables from both aspects (Holden & Rada, 2011).

The significance of TAM is derived from 3 reasons (Yoon, 2016). First, TAM mainly focuses on users' perspective, where taking users' perspective into account is an important factor in the success of technologies and systems. Second, TAM is flexible enough to examine different factors which impact the utilization of technologies. Finally, TAM has been employed widely to investigate the acceptance of various technologies.

The original TAM is composed of 5 constructs (Figure 1). According to TAM, the acceptance of new technologies can be measured by assessing 4 determinants: perceived ease of use (PEOU), perceived usefulness (PU), attitude towards use (ATU) and behavioral intention to use (BIU). PEOU can be defined as the extent to which someone believes that utilizing LMS would be free of cognitive effort, while PU means the extent to which someone believes that utilizing LMS would improve his or her performance (Davis, 1989). Figure 1 depicts that actual system use (AU) is directly influenced by BIU, that is affected by both ATU and PU. ATU is directly influenced by PU and PEOU alike. PEOU defines PU directly, and both PEOU and PU are influenced by external variables.

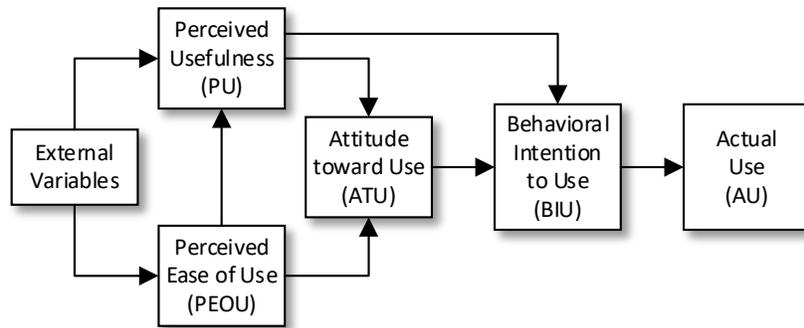


Figure 1. Technology Acceptance Model (TAM) (Davis , 1989)

4.1. TAM External Variables

In 1989, Davis proposed that TAM constructs are influenced by external variables that are related to a particular technology (Davis , 1989). As TAM is flexible enough to examine different factors, these variables can be psychological, political or organizational factors (Davis , 1989). The variables are expected to affect users' acceptance and usage of technologies (Holden & Rada, 2011). Al-Busaidi and Al-Shihi (2010) had argued that the external variables of TAM should be different from one technology to another, from one culture to another and from one user to another. Therefore, the variables that influence LMS usage in UK, for example, are different from the variables that influence LMS usage in Saudi Arabia.

4.2. TAM-Related Works

TAM has been applied in various contexts to investigate the acceptance of technologies. Muniasamy et al. (2014) examined the acceptance of an LMS at King Khalid University in Saudi Arabia. No external variables were examined. They used a survey to collect data from 160 female diploma students in Department of Information Systems. The authors tested the students' behavioral intention to use the system without examining the actual use. Interestingly, the original TAM hypotheses are supported except that ATU does not influence BIU. In the same line, Binyamin et al. (2017) investigated the acceptance and actual use of LMS at King Abdulaziz University in Saudi Arabia. Based on 142 responses from students in various educational levels and fields, findings demonstrated the original TAM constructs (PEOU, PU, ATU, BIU and AU).

Alharbi and Drew (2014) employed TAM empirically to produce a framework for predicting Saudi teachers' behavioral intention to use LMS at Shaqra University in Saudi Arabia. Three external variables were examined: lack of LMS availability, prior experience of LMS and job relevance. Alharbi and Drew concluded that the original constructs of TAM are supported, job relevance positively influences PEOU and PU and the lack of LMS availability, however, does not influence PEOU.

To investigate the acceptance of using LMS in distance learning programs, Almarashdeh and Alsmadi (2016) used the TAM model to conduct a study in the Eastern region of Saudi Arabia. The quantitative research employed 5-point Likert scale questionnaires for collecting data from 216 students at University of Dammam. In this study, the constructs of attitude toward behavior and behavioral intention were eliminated. Results from path analysis and the Pearson Correlation test demonstrated the influence of perceived ease of use and perceived usefulness on the LMS actual use. Almarashdeh and Alsmadi (2016) concluded that LMS in Saudi Arabia experience problems such as outdated features, usability and low level of utilization by teachers and students.

Far from Saudi Arabia, another TAM study was conducted by Ramirez-Anormaliza et al. (2016) in Ecuador. The aim of the study was to measure the teachers' acceptance and usage of Moodle. The proposed theoretical framework was based on the TAM model with 5 external variables: technical support, computer self-efficacy, social influence, perceived enjoyment and satisfaction. 145 teachers at University of Ecuador have demonstrated that AU is directly influenced by BIU, that is influenced by PEOU and PU, perceived enjoyment, PEOU and social influence impact PU, that influences satisfaction. In addition, perceived enjoyment and computer self-efficacy influence PEOU.

Ma et al. (2013) incorporated TAM and Task-Technology Fit (TTF) to understand the behavioral intention to use e-learning systems among nurses in various hospitals and medical centers in Taiwan. The relationship between PU,

TTF, task characteristics and technology characteristics were investigated. From the 650 responses, the authors concluded that TTF and PEOU influence PU and BIU was influenced by PU, user satisfaction and PEOU. However, PU has the strongest impact on BIU.

To produce a theoretical framework to examine students' acceptance of e-learning systems in South Korea, Park (2009) conducted a study based on TAM. The researcher investigated the influence of 3 external variables: e-learning self-efficacy, subjective norms and system accessibility. The introduced theoretical framework depicts that PEOU is influenced by system accessibility and e-learning self-efficacy. PU is influenced by PEOU, e-learning self-efficacy and subjective norms. Further, ATU is influenced by PEOU, PU and subjective norms. It was found out that BIU is influenced by ATU, e-learning self-efficacy and subjective norms.

Mohammadi (2015) has integrated the TAM model and DeLone and McLean IS success model (DeLone & McLean, 1992) to understand the actual use of e-learning systems from Iranian students' perception. The researcher examined the influence of educational quality, service quality, technical system quality, satisfaction and content information quality on the use of e-learning. From 390 responses, it was found out that the examined factors positively affect the use of e-learning systems.

These studies have demonstrated the importance and widespread use of TAM in understanding the acceptance of technologies and systems. TAM is the most popular framework for assessing users' acceptance of new technologies in the field of information systems (Al-Busaidi & Al-Shihi, 2010). The aforementioned studies examined various factors such as satisfaction, social influence, system quality, computer self-efficacy, information quality, perceived enjoyment and technical support. Although the use of TAM seems to be positively demonstrated for identifying the utilization issues of technologies (Shroff, et al., 2011), TAM application in investigating the acceptance and usage of LMS within the context of Saudi Arabia has been disregarded (Alharbi & Drew, 2014). In spite of the previous research on LMS acceptance in other countries, the students' acceptance of LMS in Saudi Arabia is still unknown due to the cultural differences (Almarashdeh & Alsmadi, 2016). This gap necessitates the need for assessing the acceptance of LMS and investigating the factors that have an influence on the usage from the perspectives of students in Saudi Arabia.

5. Research Model

Based on the original TAM and previous literature, 5 factors (experience with LMS, satisfaction, social influence, computer self-efficacy and teacher role) were employed to investigate the students' acceptance of LMS. Figure 2 depicts the proposed research model. As this study aims to evaluate the students' acceptance of LMS that is already in use, the decision was made to remove BIU construct and focus on the system's actual use (Holden & Rada, 2011). In this section, a brief description regarding each variable is provided, research hypotheses are listed and the research proposed model is introduced.

5.1. Original TAM Hypotheses

Based on the original TAM, 4 hypotheses were proposed to assess the students' acceptance and usage of LMS at KAU.

H₁: PEOU positively influence PU.

H₂: PEOU positively influence ATU.

H₃: PU positively influence ATU.

H₄: ATU positively influence AU.

5.2. External Variables

In section 4.2, studies that employed TAM to investigate the acceptance of LMS through various variables were reviewed. For the purpose of this study, the following variables were adopted:

- *Students' Satisfaction (S):* According to Oxford Dictionary, satisfaction is defined as the success in achieving someone's prediction, happiness, desire or necessity. In the context of this study, students' satisfaction means the degree to which LMS at KAU fulfills students' needs and happiness.

- *Social Influence (SI)*: The degree to which students of KAU feel that others think they should use the LMS (Kocaleva, et al., 2015).
- *Computer self-efficacy (CSE)*: It was introduced as a determinant of PEOU by Venkatesh and Davis in 1996 (Holden & Rada, 2011). For the purpose of this study, CSE means the students' ability to use the LMS (Compeau & Higgins, 1995).
- *Teachers' Role (TR)*: The degree to which KAU students feel that their teachers think they should use LMS.
- *Experience with LMS (EXP)*: Indicates the number of years students use LMS at KAU.

The relationships between the external variables are depicted in Figure 2. To test the influence of S, SI, CSE, TR and EXP on students' usage of LMS, the following hypotheses were proposed.

- **H₅**: PU positively influences S.
- **H₆**: S positively influences AU.
- **H₇**: SI positively influences PU.
- **H₈**: SI positively influences AU.
- **H₉**: CSE positively influences PEOU.
- **H₁₀**: CSE positively influences PU.
- **H₁₁**: CSE positively influences AU.
- **H₁₂**: TR positively influences PU.
- **H₁₃**: TR positively influences AU.
- **H₁₄**: EXP positively influences AU.

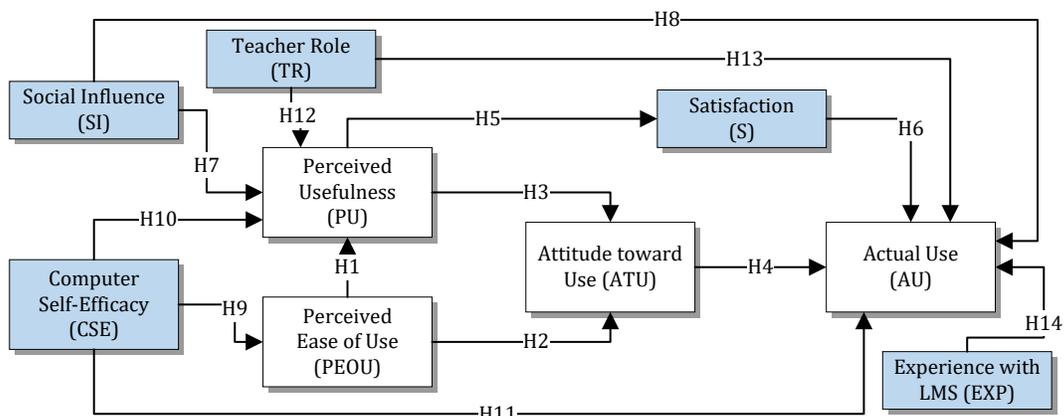


Figure 2. Research Proposed Model

6. Methodology

6.1. Sampling and Questionnaires Administration

This study targeted LMS users, studying at KAU in different educational levels and fields. The non-probability convenience sampling technique was employed due to its suitability and wide adaption in technology acceptance studies (Tahini, et al., 2014). As TAM is quantitative in nature, the decision was made to use online questionnaires for data collection (Ramirez-Anormaliza, et al., 2016; Park, 2009; Alryalat, et al., 2016; Alharbi & Drew, 2014). Althobaiti and Mayhew (2015) emphasized that questionnaires are highly appropriate for the evaluation of LMS. Due to the various advantages, Google Forms was employed as the online tool for collecting data. The questionnaire was available for 3 weeks, and the link was sent by email to students. However, the majority of students did not show the interest in filling the questionnaire and only 31 responses were received. Consequently, the decision was made to distribute the questionnaire manually. In total, 150 responses were collected, and 142 complete responses were used for data analysis.

6.2. Instrumentation

The questionnaire of the study consists of 2 sections. The first section presents the students' profiles or demographic information and includes 6 items: age, gender, prior experience with LMS, education level, field of study and GPA. The second section of the questionnaire is composed of the original TAM constructs and the external variables. The 38 items can be answered using 7-point Likert scale, where 1 means strongly disagree and 7 means strongly agree (Alryalat, et al., 2016; Ramirez-Anormaliza, et al., 2016; Yoon, 2016; Mohammadi, 2015; Holden & Rada, 2011; Alharbi & Drew, 2014). The constructs consist of PEOU (5 items), PU (5 items), ATU (5 items), AU (4 items), S (5 items), SI (5 items), CSE (5 items), and TR (4 items). To ensure the reliability and validity, the 38 items were adapted from previous literatures (Davis , 1989; Alharbi & Drew, 2014; Park, 2009; Shroff, et al., 2011; Ramirez-Anormaliza, et al., 2016).

At the first stage, the questionnaire was developed in English and reviewed by 2 native English speakers to ensure that it is free of wording problems. Then, the English version of the questionnaire was translated to Arabic by a bilingual speaker since Arabic is the native language in Saudi Arabia. As the back translation method was used (Alharbi & Drew, 2014), the Arabic version was reviewed by 2 bilingual speakers. Further, it is worth mentioning that the word LMS was replaced with Blackboard since the used LMS is Blackboard.

7. Findings

7.1. Demographic Information

The students' profiles are summarized in Table 1. 123 students (86.6%) are male, and 19 students (13.4%) are female. The majority of the students (66.9%) are within the range of 21 and 25 years old. All students have at least 1 year of experience with LMS. Regarding the education level, the majority of the participants are students with Bachelor's degree (73.2%). The study includes students from different disciplines and fields.

Table 1. Participants' Demographic Information

Demographics	category	F	%
Gender	Male	123	86.6
	Female	19	13.4
Age	< 21	28	19.7
	21 – 25	95	66.9
	26 – 30	11	7.7
	> 30	8	5.6
Experience with Blackboard	< 1 year	70	49.3
	1 - 2 years	48	33.8
	> 2 years	24	16.9
Education level	Diploma	19	13.4
	Bachelor	104	73.2
	Master	16	11.3
	PhD	3	2.1
Field of Study	Medical Science	21	14.8
	Applied Science	48	33.8
	Natural Science	22	15.5
	Humanities and Social Sciences	51	35.9
GPA	0 – 2.99	16	11.3
	3 – 3.99	66	46.5
	4 – 5	60	42.3

7.2. Descriptive Statistics

Based on SPSS Statistics 23, Table 2 summarizes the descriptive analysis of the students' responses for the 38 items. All the mean values are above 4.73, which demonstrate that the LMS is perceived positively among Saudi students. Among the external variables, students rated teachers' role as the most influential factor on LMS usage followed by students' satisfaction. However, PEOU was the highest among the original constructs of TAM. The standard deviation values are within the range of 1.14 and 1.48, which indicate that the data are very close to the mean.

Table 2. Descriptive Statistics

Constructs	Number of Items	Mean	Standard Deviation	Cronbach's alpha
PEOU	5	5.45	1.14	.893
PU	5	5.23	1.28	.875
ATU	5	5.40	1.24	.914
AU	4	4.74	1.48	.851
S	5	5.34	1.44	.939
SI	5	5.28	1.23	.863
CSE	5	5.30	1.36	.864
TR	4	5.56	1.30	.866

7.3. The Reliability of the Instruments

Although studies (Alharbi & Drew, 2014; Ramirez-Anormaliza, et al., 2016; Shroff, et al., 2011; Ma, et al., 2013; Almarashdeh & Alsmadi, 2016) demonstrated the high reliability of TAM, the reliability test of the questionnaire instruments was conducted for the study in hands. Reliability is the internal consistency or the instruments ability to generate the same findings under the same situations (Field, 2013). As Cronbach's alpha test has been used widely to indicate the reliability (Orfanou, et al., 2015), Cronbach's alpha was employed to assess the internal consistency of the instruments (Alharbi & Drew, 2014). The reliability of measures is acceptable when Cronbach's alpha value is greater than 0.7 (Sekaran & Bougie, 2013). Table 2 indicates that Cronbach's alpha value of the instruments is within the range of .851 and .939, and the overall alpha value is 0.968. Therefore, the findings demonstrate the high reliability of the questionnaire instruments.

7.4. Hypotheses Testing

Based on multiple regression analysis, the proposed model and hypotheses were examined (Alryalat, et al., 2016; Ramirez-Anormaliza, et al., 2016; Almarashdeh & Alsmadi, 2016). Table 3 summarizes the results of the path test and indicates that all the proposed paths are supported. The majority of the relationships maintain a high level of significance. The strongest path is presented in the relationship between PU and ATU; however, the weakest path is presented in the relationship between EXP and AU. The results are depicted in Figure 3.

In terms of the variance of constructs, 46% of variance in AU is predicted by ATU, S, SI, CSE, TR, and EXP. 65.3% of variance in ATU is explained by PU and PEOU; a high percentage. 49% of variance in PU is explained by PEOU, SI, CSE and TR.

Table 3. Hypotheses Tests Summary

	Path	β	t	p-value	Result
H ₁	PEOU → PU	.618**	9.31	p<0.001	Supported
H ₂	PEOU → ATU	.633**	9.67	p<0.001	Supported
H ₃	PU → ATU	.790**	15.25	p<0.001	Supported
H ₄	ATU → AU	.559**	7.98	p<0.001	Supported
H ₅	PU → S	.762**	13.93	p<0.001	Supported
H ₆	S → AU	.557**	7.93	p<0.001	Supported
H ₇	SI → PU	.519**	7.17	p<0.001	Supported
H ₈	SI → AU	.561**	8.01	p<0.001	Supported

H ₉	CSE → PEOU	.572**	8.25	p<0.001	Supported
H ₁₀	CSE → PU	.537**	7.53	p<0.001	Supported
H ₁₁	CSE → AU	.517**	7.14	p<0.001	Supported
H ₁₂	TR → PU	.572**	8.24	p<0.001	Supported
H ₁₃	TR → AU	.538**	7.56	p<0.001	Supported
H ₁₄	EXP → AU	.386**	4.96	p<0.001	Supported

7.5. Actual Use and External Variables Correlations

The Spearman correlation test was used to investigate the correlation between the TAM construct (AU) and the external variables (Alharbi & Drew, 2014). Results are depicted in Table 4. All the 5 examined variables are associated with students' actual use of LMS. Findings indicate that AU is strongly associated with S, SI, CSE, and TR. There is a moderate correlation between AU and EXP. Hence, S, SI, CSE, TR, and EXP positively influence AU.

Table 4. AU and External Variables Correlations

	AU	S	SI	CSE	TR	EXP
AU	1.000					
S	.516**	1.000				
SI	.542**	.644**	1.000			
CSE	.512**	.516**	.407**	1.000		
TR	.531**	.679**	.639**	.602**	1.000	
EXP	.409**	.213*	.179*	.286**	.125	1.000

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

8. Discussion and Conclusion

As little research has been done to understand students' use of LMS, this study was conducted to investigate the acceptance and use of the LMS at KAU from the perspectives of Saudi students. The study aims to understand the factors that lead to the proper utilization of LMS within the context of Saudi Arabia by examining the association between the students' actual use of LMS and external variables: prior experience with LMS, satisfaction, social influence, computer self-efficacy and teacher role. Therefore, this study is the first to investigate the influence of previous factors on students' actual use of LMS in the context of Saudi Arabia.

The results prove that Saudi students perceive LMS positively (Binyamin, et al., 2017; Almarashdeh & Alsmadi, 2016). This study adds to the evidence of the high reliability of TAM through the use of Cronbach's alpha measure (Ramirez-Anormaliza, et al., 2016; Ma, et al., 2013). Findings demonstrate the original TAM constructs in Saudi Arabia (Binyamin, et al., 2017; Alharbi & Drew, 2014). The regression analysis reveals that all the proposed hypotheses are supported. Moreover, the Spearman rank correlation test demonstrates that the students' use of LMS is associated with the 5 external variables: prior experience with LMS, satisfaction, social influence, computer self-efficacy and teacher role. As TAM has barely been used in understanding the students' usage of LMS in Saudi Arabia, the findings might provide the stakeholders of KAU with insights regarding the Saudi students' perspective of LMS. The results of the study may interest researchers, teachers, students, ministry of education and higher educational institutions in Saudi Arabia. The research provides fundamentals for LMS acceptance and usage; therefore, the study can be used during the development stage of LMS to ensure the adoption of the proposed factors.

The study is not free of limitations. The sample of the experiment includes only 19 female students and 3 PhD students. For this reason, another study might be conducted to expand the sample to include more female and PhD students. Additionally, the participants were students at KAU. The scope of the study can be expanded to include students from different academic institutions or universities in Saudi Arabia. This study took an account of 5 external variables; therefore, future research should consider the investigation of other variables in the context of Saudi Arabia. Finally, this study investigated only the perception of students. Later, teachers and administrators can be added to the scope of the study.

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