Instructors' Behavioural Intention to Use Learning Management System: An Integrated TAM Perspective

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Abstract **– The higher educational institutions are introducing and implementing Learning Management Systems (LMS) for effective communications with students and for adoption of technology based learning processes. However, the success of LMS depends mostly on instructors' adoption of LMS. This study is incorporating different important factors with TAM to study the impacts of these factors on instructors' behavioural intention to use LMS. A sample of 247 instructors was used for model testing. PLS-SEM technique was used as a testing method. The PLS-SEM results show that Task Technology Fit (TTF), Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) have direct impacts on behavioural intention while TTF, Compatibility, Convenience, Self-Efficacy, Personal Innovativeness and Subjective Norm have significant impacts on PU and PEOU. Empirical findings of this research provide a better understanding for instructors' adoption of LMS. In addition, the research highlights different aspects that lead towards successful adoption of LMS.**

Keywords **- Learning Management Systems, Task technology Fit, Compatibility, Convenience, Self-Efficacy, Information Systems, Information and Communication Technologies**

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1. Introduction

The wide spread use of information and communication technologies (ICT) has influenced every business. Like other industries, it has brought many transformations in education industry like from paper-based books to digital books and campus-located classrooms to virtual classrooms.

The fast expansion of internet and ICT encourage universities to transform their educational programs by adopting communication tools and e-learning applications to ensure ubiquitous communication with students. Through the use of technology, teaching and learning can be made interactive and in turn the instructions become more effective [1]. Learning Management Systems (LMS) is one of such technologies that support e-learning programs [2].

In higher education, LMS integration into teaching and learning has been increased [1]. However, the universities need to evaluate the use of LMS for the success of e-learning program [3]. The universities should evaluate the effectiveness of LMS in terms of achievement of the learning objectives. Appropriate execution of the technology is important to achieve the objectives, however, most often objectives of such implementation are not met [4]. The role of instructors, students and university support in the success of such technology is important. Within the important factors of LMS (like appropriate technology execution, evaluation of the effectiveness of LMS, the role of students and teachers), instructors play a vital role in the success of e-learning process [5]. The teachers should be competent enough to use technology and their knowledge, experience and perception about the technology are important factors affecting the technology integration in an e-learning process [1]. The teachers' online interaction with students need from them more thinking about the success of learning process, therefore it is important to evaluate LMS with teachers' perspective [6].

Researchers have worked on finding the critical factors affecting instructors' intention to use LMS and, keeping in view the important role of instructors

in the implementation of LMS, have recommended further research in this regard [2], [7], [8]. Almarashdeh (2016) studied the experiences of instructors with the perspective of instructors satisfaction in distance learning course and recommended more research to determine the factors that motivate instructors to use LMS. Coskuncay & Ozkan (2013) worked on a model on instructors' adoption of LMS and recommended that future research may extend their model in the context of other settings. Research is still needed in the field of IS to identify the organizational means through which the management can influence users' beliefs and attitudes and motivate them to use the IS [9].

The aim of this research is to identify the factors affecting instructors' intention to adopt LMS in higher education. In the light of extant research, these factors are divided into three categories namely technology, personal and social factors. To achieve this aim, this study is devised to answer the following question: Which factors are important that influence the behavioural intention of university instructors to use LMS. For this purpose, we extend the model presented by Coskuncay & Ozkan (2013). This study adopts Technology Acceptance Model (TAM) [10] as the base model. Further important factors like task technology fit, Compatibility, Convenience, Self-Efficacy, personal Innovativeness and Subject Norm are integrated to TAM in the light of extant research. Empirically validated model is presented by this study and recommendations are given based on the validated model. The findings of this study can be used by academia and industry for further research and successful implementation of LMS in higher education.

2. Theoretical Background and Hypotheses

2.1 Technology Acceptance Model (TAM)

Davis (1989) proposed technology acceptance model based on theory of reasoned action (TRA). The TAM posits that the actual use of information systems (IS) is determined by user's intention that in turn is determined by user's attitude. The attitude is determined by two constructs, perceived usefulness (PU) and perceived ease of use (PEOU). PEOU has a positive influence on PU. TAM was originally proposed for adoption of new IS. Researchers have used TAM in different contexts by adding additional constructs to it. Such extension can be divided into three categories like adding constructs from related models, adding further belief constructs and investigating determinants of PU and PEOU [12]. TAM has been used extensively in IS research and the prediction power of TAM in users' behaviour has been confirmed by many studies [2], [9], [13], [14]. W. T. Wang & Wang (2009) studied the instructors' adoption of web-based learning systems, and recommended further research on external variables affecting the PU and PEOU [15]. Keeping in view the parsimonious nature of TAM, this study is integrating technology factors (like TTF, Compatibility and Convenience), personal factors (like Self-Efficacy and Personal Innovativeness) and social factor (Subjective Norm) with TAM to test a model to evaluate Instructors' Behavioural Intention to use LMS in higher education.

This study is considering three constructs of TAM i.e. PU, PEOU and Behavioural Intention to Use (BI). PU is the degree to which a person perceives that using a technology will increase his job performance [11]. PEOU is the extent to which a user thinks that his effort to perform a task will be reduced [11]. Researchers have tested the relationships of PU, PEOU and BI in different contexts of IS and have confirmed the influence of PEOU on PU and positive impacts of both PU and PEOU on BI. Hwang (2016) studied the content management system and confirmed the positive impacts of PEOU on PU. In a study made in Turkey to understand the predictors of instructors' BI in using LMS, Cigdem & Topcu (2015) found positive influence of PEOU on PU and PU on BI. Coskuncay & Ozkan (2013) proposed a model for LMS in higher education context and confirmed the positive relationships between the constructs PEOU, PU and BI. In the light of the above facts, we set the hypotheses:

H1. PU has positive influence on BI.
H2. PEOU has positive influence on BI.
H3. PEOU has positive influence on PU.

2.2 Task Technology Fit (TTF)

Goodhue (1995) proposed a user evaluation construct of IS success i.e., Task Technology Fit (TTF) [16]. TTF concentrates on the extent to which the systems' characteristics fulfill the task's needs of the user. They posited that higher is the value of the TTF, more will be the performance. They further posited that task characteristics and technology characteristics are two important determinants of TTF. According to TTF, the users will use the IS if it best fits the required task [17]. TTF model has the capacity to better explain the users' adoption of IS and researchers have tested TTF in different contexts like mobile commerce, mobile information systems, e-learning, and e-books [18–21].

Researchers have integrated TTF with other models because TTF has ignored perceptions of the users and users' contribution is a main feature in knowledge management systems [22]. Prior research

has suggested that there is a direct impact of the IS task-fit on the users' performance [23]. For the perceptions whether a particular technology fits well in a particular situation, the PEOU and PU of users can be the basis only for perceptions regarding the actual use [24]. Significant impacts of TTF on PEOU and PU have been confirmed [25]. If the users will find a fit between the technology and the needed task, they will find it more useful and easy to use and in turn, it will affect the behavioural intention to use the technology. Therefore, the direct and indirect impacts of TTF on behavioural intention are expected. Hence, we set the hypotheses:

H4. TTF positively affects BI.
H5. TTF positively affects PU.
H6. TTF positively affects PEOU.

2.3 Compatibility

According to Innovation diffusion theory (IDT), there are five attributes of an innovation namely, relative advantage, compatibility, trialability, complexity and observability [26], [27]. Compatibility means the degree to which an innovation refers to the extent to which the innovation is harmonious with the user beliefs, knowledge, experience and existing requirements and high levels of compatibility leads to high degree of innovation adoption [27]. Researchers have used compatibility construct in understanding IS adoption in different contexts. Coskuncay & Ozkan (2013) proposed a model for instructors' adoption of LMS in which significant impacts of compatibility on PU and BI were not confirmed. In some other studies regarding e-books and m-learning adoption, significant influences of compatibility were confirmed on PU, PEOU and BI [14], [28]. Lai & Ulhas (2012) have also argued that compatibility has positive effect on PU. In this study, we assume that if the instructors will find LMS more consistent with their beliefs, knowledge and experience, they will be more eager to adopt and hence they will perceive LMS more useful and more easy to use. Hence, we set the hypotheses:

H7. Compatibility positively affects PU.
H8. Compatibility positively affects PEOU.

2.4 Convenience

Yoon & Kim (2007) argued that the online computing technologies give more convenience than performing smart communications, therefore, perceived convenience is an important factor of individual's adoption of IT. Convenience is the extent to which an e-service is found to be convenient and easy in terms of exertion and time saving [31]. Using LMS, the users perceive convenience as the technology in use provides many integrated ubiquitous features like easy and fast collaboration with students, availability of academic information and keeping track of students' activities. In terms of e-textbook application, as the students perceive e-textbook application as a service provider, therefore, convenience can be termed as e-service convenience rather than behavioural convenience [29]. Cheng (2015) studied the role of technological characteristics in m-learning acceptance and confirmed the significant effects of convenience on PU and PEOU. The strong relationships between perceived convenience and PU and PEOU were also confirmed by [30]. The convenient features of e-textbook application can influence students' perceived convenience regarding e-textbook applications which in turn affects PU and PEOU [29]. This study considers convenience as a technological factor and assumes that convenience is an important antecedent of instructors' perceptions about the adoption of LMS. Moreover, we set the hypotheses that instructors with high levels of convenience perceptions will consider LMS more useful and easier to use. Hence,

H9. Convenience positively affects PU.
H10. Convenience positively affects PEOU.

2.5 Self-Efficacy (SE)

Self-Efficacy is the extent to which an individual feels himself capable of performing a task [32]. Many researchers have confirmed the important roles of SE in IS adoption [33], [34]. Higher levels of SE lead to more usage of IS [35]. Positive impacts of SE on both PEOU and PU have been confirmed by prior research [14], [33], [36], [37]. In the context of LMS use by university instructors, we assume that instructors having high levels of SE will make more usage of LMS and will find LMS more useful and more easy to use. Hence we set the hypotheses:

H11. Self-Efficacy positively affects PU.
H12. Self-Efficacy positively affects PEOU.

2.6 Personal Innovativeness (PI)

Individual's personal innovativeness is an important factor of individual's adoption behaviour for a new technology [26]. Personal innovativeness refers to the degree of willingness of individual to test new IT [38]. Higher levels of PI leads to more inclination towards new IS innovations [39]. Innovative users, being more bold and adventurous, are more eager to adopt new technologies despite the chances of more uncertainties in adoption of new IT

[40]. Yang (2005) argued that individual innovativeness has significant positive impacts on PU and PEOU [41]. Han & Shin (2016) studied the use of m-LMS and have argued that students with positive attitudes towards technology (self-efficacy, innovativeness, PU, PEOU) are more likely to adopt mobile devices. Kuo & Yen (2009) also mentioned that individuals with higher individual innovativeness lead to higher perception of ease of use of mobile services [42]. Hence we set the hypotheses:

H13. Personal Innovativeness positively affects PU.

H14. Personal Innovativeness positively affects PEOU.

2.7 Subjective Norm (SN)

Subjective norm has been defined by [43] as the perception of users that people who are important for him want him or do not want him to perform a behaviour in a matter. In this study, SN means the user's perception about the thinking/demand of important persons to use LMS. Cheng (2011) argues that if a person perceives that his teachers or peers think that he should use the e-learning system, then he merges their beliefs into his own beliefs and considers the e-earning system more useful [44]. If instructors feel that their management or colleagues think they should use LMS, they start its use and it affects their perceptions about ease of use [45]. Prior research has confirmed significant impacts of SN on PU and PEOU [2], [8], [14], [33]. Thus, we propose the following hypotheses:

H15. Subjective Norm positively affects PU.

H16. Subjective Norm positively affects PEOU.

3. Conceptual Model

Conceptual model of the study is depicted in Figure 1.

4. Methodology

4.1 Research Instrument Development

The measurement items of this study were adopted from well-established prior research and were modified for LMS. The questionnaire is composed of two parts. The first part is about demographic information and the second part is composed of 30 measurement items measuring nine constructs of model under study. Measurement items of this study have been listed in Appendix-A.

4.2 Data Collection and Sample

The target sample of the study are the university instructors. We used convenience-sampling technique to collect the required sample. For minimum target sample of this study, we followed the rule of 15 cases per predictor as suggested by [46]. In this way, we needed at least 135 samples. For this purpose, online questionnaires were distributed amongst instructors of large public sector university in the central region of Saudi Arabia and 76 responses were returned online. To cope with the minimum sample size, hardcopies of the questionnaire were also distributed and 183 responses were collected. Twelve cases were discarded due to missing data, more than 5% in each case and remaining 247 cases were used for data analysis. Demographic information is listed in Table-1.

5. Data Analysis And Results

PLS-SEM (Partial Least Square-Structural Equation Modelling) method is used to analyze our model. PLS is a widely popular method used to test theory which not only studies the psychometric properties of the measurement scale but it helps in evaluating the relationships amongst the constructs [47]. SmartPLS 3 was used as the main tool to analyze data. Details of measurement model analysis and structural model analysis are listed in the following sections.

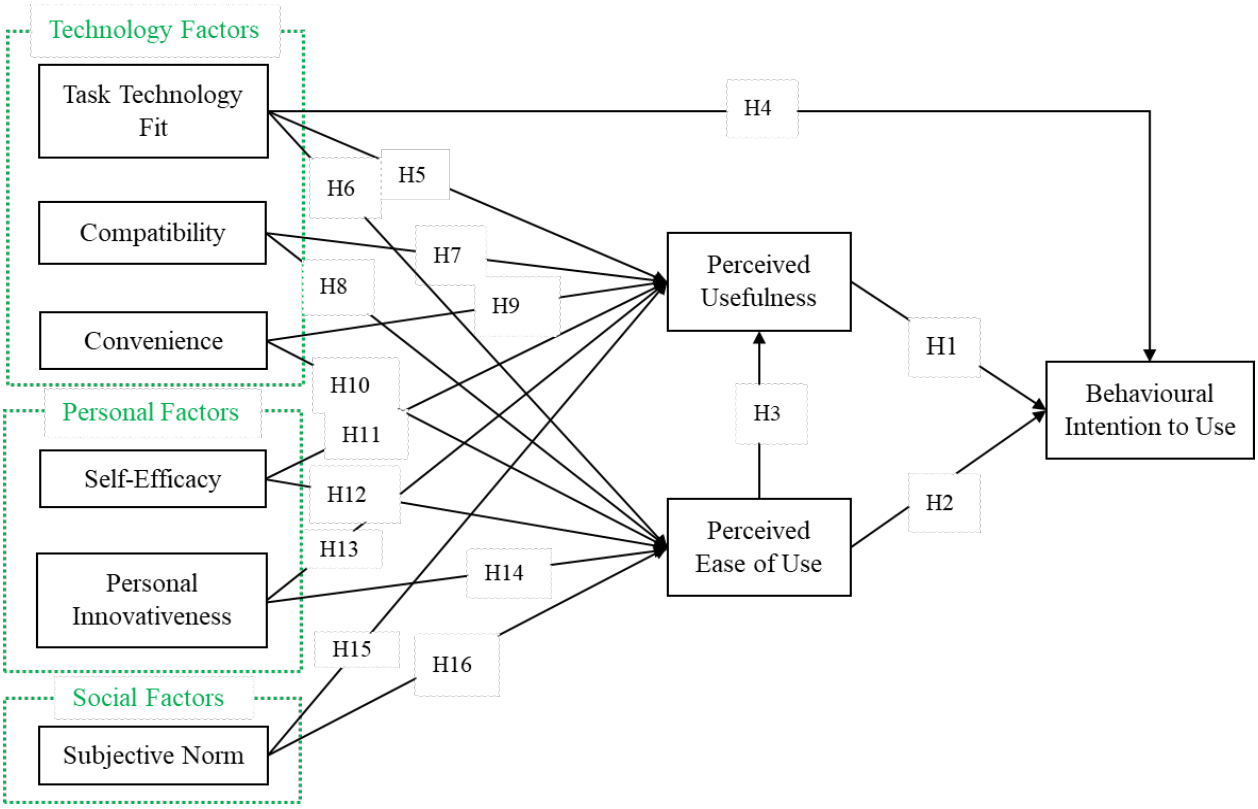

Figure 1. Conceptual Model

5.1 Measurement Model Analysis

To assess the measurement model characteristics of the nine reflective constructs, we carried out the tests suggested by [48]. For this purpose, Internal Consistency Reliability (Cronback's Alpha $\alpha > 0.6$ and Composite Reliability CR > 0.7), Indicator Reliability (>=0.7), Convergent Validity (Average variance extracted (AVE) >0.5) and Discriminant Validity (Fornell-Lacker's Criterion) were assessed. Results of these tests are listed in Tables 2., 3. and 4.

Contents of Table 2. show that the values of Cronback's alpha, composite reliability and indicator's reliability are more than the threshold values that show the internal consistency reliability of the measurement items. Table 3. provides values of AVE greater than 0.5 that show convergent validity. It is evident from Table 4. that the diagonal elements (the square root of AVE) for each construct is more than its highest correlation with other constructs that show discriminant validity among the constructs.

Table 1. Demographic Information of the Sample

Item	Characteristics	Percentage (%)
Gender	Male	68.4
	Female	31.6
Age Group	21 to 30 years	19.0
	31 to 40 years	50.2
	41 to 50 years	21.9
	Over 50 years	8.9
Qualification	Masters	26.7
	Ph.D.	73.3
Designation	Teaching Assistant	1.6
	Researcher	7.7
	Lecturer	17.4
	Assistant Professor	49.0
	Associate Professor	17.4
	Professor	6.9

Table 2. Reliability Tests Summary

Construct	Cronback's alpha	Composite Reliability	Items	Indicators' reliability
	>0.6	**>0.7**		**>=0.7**
BI	0.879	0.925	BI1 BI2 BI3	0.882 0.908 0.900
COMP	0.832	0.899	COMP1 COMP2 COMP3	0.868 0.885 0.842
CONV	0.836	0.890	CONV1 CONV2 CONV3 CONV4	0.787 0.808 0.832 0.842
PEOU	0.856	0.903	PEOU1 PEOU2 PEOU3 PEOU4	0.829 0.844 0.841 0.830
PI	0.738	0.845	PI1 PI2 PI3	0.845 0.859 0.699
PU	0.890	0.924	PU1 PU2 PU3 PU4	0.837 0.856 0.878 0.898
SE	0.751	0.857	SE1 SE2 SE3	0.820 0.825 0.803

Construct	Cronback's alpha	Composite Reliability	Items	Indicators' reliability
	>0.6	**>0.7**		**>=0.7**
SN	0.718	0.840	SN1 SN2 SN3	0.846 0.713 0.830
TTF	0.816	0.891	TTF1 TTF2 TTF3	0.849 0.885 0.831

Table 3. Convergent Validity

Construct	AVE>0.5	Construct	AVE>0.5
BI	0.805	**PU**	0.753
COMP	0.749	**SE**	0.666
CONV	0.668	**SN**	0.638
PEOU	0.699	**TTF**	0.731
PI	0.646		

Table 4. Discriminant Validity

	BI	COMP	CONV	PEOU	PI	PU	SE	SN	TTF
BI	**0.897**								
COMP	0.317	**0.865**							
CONV	0.293	0.386	**0.818**						
PEOU	0.599	0.407	0.415	**0.836**					
PI	0.218	0.152	0.196	0.277	**0.804**				
PU	0.618	0.498	0.44	0.592	0.318	**0.868**			
SE	0.396	0.296	0.253	0.316	0.055	0.43	**0.816**		
SN	0.279	0.194	0.19	0.367	0.23	0.403	0.105	**0.799**	
TTF	0.58	0.329	0.287	0.492	0.221	0.487	0.267	0.231	**0.855**

5.2 Structural Model Analysis

5.2.1. Assessment of Structural Model for Collinearity Issues

To assess the structural model for collinearity issues, Tolerance and VIF values were calculated and examined. All Tolerance values were above 0.2 and VIF values were found below the threshold (below 5) which indicates that there are no collinearity issues.

5.2.2. Coefficient of Determination (R^2)

Coefficient of Determination (R^2) is calculated to evaluate the predictive power of the model. Figure 2. shows the results of structural model analysis. Each of the endogenous construct namely PU (55.8%), PEOU (42%) and BI (52.6%) describes the acceptable level (>50%) of R^2. Thus, the proposed model has moderate level predictive power to explain the instructors' adoption of LMS.

5.2.3. Hypotheses Testing

For hypothesis testing, bootstrapping procedure was used with 5000 bootstrap subsamples. Path coefficients with the relevant t and p values have been considered for evaluation of results. Table 5. lists results of hypotheses testing.

All hypotheses of this study have been supported. PU (β=0.317, $p<0.01$) has stronger effect on BI than PEOU (β=0.265, $p<0.01$). The impacts of TTF on BI, PU and PEOU have also been confirmed (H4, H5, H6). Compatibility has significant impacts on both PU and PEOU and its impacts on PU are stronger than PEOU (H7, H8). The relationships of Convenience with PU and PEOU are also significant (H9 and H10 supported. Significant impacts of personal factors (Self-Efficacy, Personal Innovativeness) and subjective norm have also been confirmed on both PU and PEOU (H11 to H16).

Table 5. Summary of Structural Model Path Coefficients

Hypotheses #	Path	Path Coefficient	Standard Deviation	T Statistics	P Values	Sig. Level
H1	PU -> BI	0.317	0.065	4.904	0.000	***
H2	PEOU -> BI	0.265	0.066	3.992	0.000	***
H3	PEOU -> PU	0.225	0.074	3.021	0.003	***
H4	TTF -> BI	0.296	0.057	5.196	0.000	***
H5	TTF -> PU	0.157	0.055	2.853	0.004	***
H6	TTF -> PEOU	0.288	0.057	5.035	0.000	***
H7	COMP -> PU	0.197	0.056	3.501	0.000	***
H8	COMP -> PEOU	0.151	0.060	2.514	0.012	**
H9	CONV -> PU	0.118	0.053	2.232	0.026	**
H10	CONV -> PEOU	0.187	0.064	2.916	0.004	***
H11	SE -> PU	0.204	0.057	3.612	0.000	***
H12	SE -> PEOU	0.121	0.054	2.233	0.026	**
H13	PI -> PU	0.117	0.050	2.363	0.018	**
H14	PI -> PEOU	0.102	0.054	1.883	0.060	*
H15	SN -> PU	0.175	0.051	3.444	0.001	***
H16	SN -> PEOU	0.199	0.054	3.686	0.000	***

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; NS= Not Significant.*

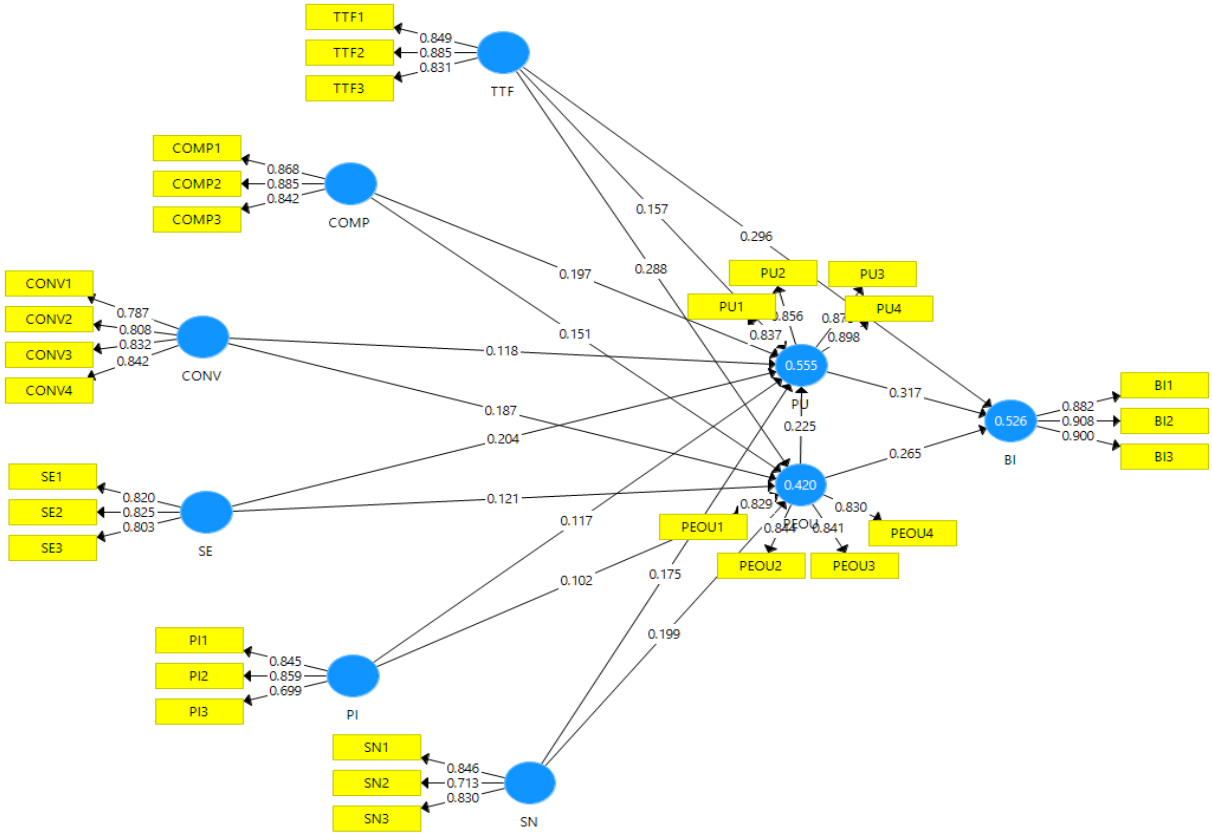

Figure 2. SEM Analysis of Conceptual Model

5.2.4. *Effect Size (f^2)*

The effect size (f^2) of PU on BI is (0.127) and the effect size (f^2) of TTF on BI is (0.129). Thus by omitting TTF from the model will bring medium level change in the value of R^2 of BI.

$$f^2 = \frac{R^2 \ included - R^2 \ excluded}{1 - R^2 \ included}$$

5.2.5. *Predictive Relevance (Q^2)*

To know the predictive relevance of the structural model, Q^2 is estimated. It helps in understanding whether an endogenous variable is predicted correctly by its indicators in the reflective model. To obtain the value of Q^2, we used blindfolding procedure for an omission distance 7. Values of Q2 for all endogenous variables PU (0.385), PEOU (0.270) and BI (0.398) are above the threshold value zero that show the predictive relevance of the model [49].

6. Discussion

This study aims to identify the factors that affect instructors' intention to adopt LMS in higher education. For this purpose, technology acceptance model is incorporated with technology factors, personal and psychological factors and social factors to present a model that can better explain the instructors' adoption of LMS in higher education. The results of this study indicate that the behavioural intention to use LMS is predicted mainly by three factors, namely PU, PEOU and TTF. It shows that other than perceptions of the users regarding the technology, the technology should be fit for the task concerned. The two important mediating variables PU and PEOU are predicted by technological characteristics (TTF, Compatibility and Convenience), personal and psychological characteristics (Self-Efficacy and Personal innovativeness) and the social factor Subjective Norm. If the instructors will find LMS more fit for their academic activities, more compatible and more convenient to use, they will in turn find it more useful, more easy to use and hence, their intention to use will be affected positively. Similarly, the users' PU and PEOU perceptions regarding the LMS are also based on their personal qualities like Self-Efficacy and Personal innovativeness. Moreover, the instructors' intention to use LMS is also influenced by the use of LMS by their department heads, colleagues and subordinates. The results listed above in Table 5. support the hypothesized relationships in the proposed model which is consistent with the prior research [8], [13], [14], [25], [28]–[30], [36], [41], [45].

The LMS designers should consider the technological factors like TTF, compatibility and convenience while designing the LMS. In addition, the instructors' personal characteristics like Self-Efficacy and Personal Innovativeness to use new technologies also perform important role in adoption of the LMS. Significant impacts of subjective norms indicate that the universities should provide an environment to use the LMS where the instructors are motivated towards the use of the LMS. For successful deployment of the LMS, the institutions should ensure that LMS is effective, easy to use and equipped with technological functionalities that best fit the academic tasks.

7. Theoretical & Practical Implications

Results of this study show that the proposed model has good explanatory power to explain the adoption of the LMS by instructors at higher educational institutions. This research enhances the studies made by [2] and [8]. It contributes to research by working on antecedents of PU and PEOU and the results provides evidence of significant impacts of TTF, Compatibility, Convenience, Self-Efficacy, Personal Innovativeness and Subjective Norm on PU and PEOU and in this way indirect effects of these factors on behavioural intention to use the LMS are confirmed. Future research may enhance this model to study other factors necessary for adoption of the LMS by instructors and students.

The model presented in this study has also important implications to practice. This model provides a good base for LMS adoption at higher education. The designers and application programmers of LMS may consider broad technological features other than effectiveness and ease of use. They will prepare such applications that will be easily accessible and compatible with various platforms and users' abilities. These technological features will boost users' perceptions regarding effectiveness and ease of use and in turn, their intention to use will be strengthened. In addition, keeping in view the significant impacts of subjective norm on PU and PEOU, the institutions should provide support and motivation to instructors to use the LMS. They should arrange such training sessions through which the personal and psychological traits (Self-Efficacy & Personal innovativeness) of instructors can be enhanced. It will result in fruitful implementation of the LMS at higher educational level.

8. Limitations And Future Research

The proposed framework has tried to identify the factors that have direct and indirect impacts on behavioural intention of instructors to use LMS. Although this study enhances the extant research of LMS adoption by testing a model and providing empirical insights, yet there are limitations with this research that provide opportunities for future research. First, the model explains 52.6% of the variance in behavioural intention that shows the possibility of other factors that contribute to behavioural intention. Further studies can explore those factors. Second, the data for model testing was collected from one university, future studies can test the model by collecting sample from different universities. Third, the moderating effects of age, gender and facilitating conditions can also be tested. Fourth, the field of information systems is dynamic and changes occur with the passage of time. Longitudinal studies may yield more accurate results. Fifth, all respondents of this study were experienced users, therefore excluding non-response bias is not possible. Future research may consider experienced and inexperienced users of LMS. Finally, researchers may test the model in other contexts of IS.

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Appendix-A Questionnaire Items

S.No	Construct	Items		Reference
1.	TTF	TTF1	The functions of LMS are enough to help manage my academic work.	adapted from [50], [51] (Modified for LMS).
		TTF2	The functions of LMS are appropriate to help manage my Academic Work.	
		TTF3	In general, the functions of LMS fully meet my needs of Academic Work.	
2.	Compatibility	COMP1	Using LMS is appropriate for my Academic activities.	[14] (Modified for LMS).
		COMP2	Using LMS do not conflict with my Academic activities.	
		COMP3	Using LMS is more compatible with my Academic activities than doing academic activities manually.	
3.	Convenience	CONV1	Using LMS enables me to search for the academic information/content I need without time constraints	[29] (Modified for LMS).
		CONV2	Using LMS saves my effort in performing academic activities	
		CONV3	Using LMS allows me to improve learning outcomes	
		CONV4	I can conveniently access and use LMS quickly	
4.	Self-Efficacy	SE1	I do not feel difficulties to use LMS	[52] (Modified for LMS).
		SE2	I do not need some people's help to use LMS	
		SE3	I have a confidence to use LMS	
5.	Personal Innovativeness	PI1	If I heard about a new IT, I would look for ways to gain experience with it	[53]
		PI2	Among my peers, I am usually the first to try out new information technologies	
		PI3	I like to experiment with new information technologies	
6.	Subjective Norm	SN1	My colleagues encourage me to use LMS	[2]
		SN2	My assistants / instructors support me to use LMS	
		SN3	Head of my department supports me to use LMS	
7.	Perceived usefulness	PU1	LMS enhances my course performance	[2]
		PU2	LMS increases productivity of the course	
		PU3	LMS helps me to satisfy the purpose of the course easily	
		PU4	LMS gives me a greater control over my course	
8.	Perceived Ease of Use	PEOU1	Interacting with LMS is clear and understandable	[2]
		PEOU2	Interface of the LMS is clear and easy to understand	
		PEOU3	Navigation among tools is not difficult	
		PEOU4	Interacting with LMS is not complicated	
9.	Behavioural Intention to Use	BI1	I will use LMS in the next semesters	[2]
		BI2	I plan to use LMS in all of my courses	
		BI3	It is worth to use LMS	