COMMUNICATION ENABLED BY LMS: AN EMPIRICAL STUDY BASED ON TAM

A

Thesis submitted

In the partial fulfilment of the requirement of the degree of

MASTERS OF ARTS IN PSYCHOLOGY

Submitted by:

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CERTIFICATE

It is to certify that the thesis, **"Communication enabled by LMS: An empirical study based on TAM,"** submitted to **Thapar Institute of Engineering & Technology, Patiala**, in partial fulfilment of the requirements for the award of the degree of **Master of Arts in Psychology**, is the bona fide record of original work done by the candidate from January 2021 to June 2021 under the supervision of Dr Santha Kumari. The work was planned, organized and executed in the **School of Humanities & Social Sciences.** This study has not previously formed the basis for the award of any degree, diploma, fellowship or other similar titles.

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I hereby certify that the work presented in this thesis**, "Communication enabled by LMS: An empirical study based on TAM,"** submitted in the **School of Humanities & Social Sciences**, **Thapar Institute of Engineering and Technology, Patiala**, in fulfilment of the requirement for the award of the degree of **Masters of Arts in Psychology**, is an original and authentic record of my work carried out under the supervision & guidance of Dr Santha Kumari, Professor, School of Humanities & Technology, Thapar Institute of Engineering and Technology, Patiala. Whenever I have used materials (data, theoretical, analysis, and text) from other sources, I have given due credit to them by citing them in the text of the thesis and giving their details in the references. The information contained in the thesis has not been used to grant any other degree from this or any other university.

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ABSTRACT

Following the global trend and facing the need of the hour, most Indian universities have adopted open-source LMS. However, the utilization of LMS in India is still a matter of concern. Even if institutions spend a lot of money and resources on LMS implementation, the system will not be properly utilized if the users do not accept and use it. When users are faced with a new form of e-learning, they must adapt it; their perceptions of how to use and accept an e-learning system can influence a variety of elements.

Thus, this study aimed to explore the acceptance of LMS within the context of India. The study utilizes Technology Acceptance Model (Davis, 1989) to understand the students' acceptance of an LMS in an Indian University. Apart from the existing TAM constructs, the investigation also included one external variable, communication enabled by LMS, to study the LMS acceptance by the students. Thus, for the purpose of SEM, the present study employs both Amos 24.0 and SmartPLS3 to develop and analyze the model developed in the current research.

The research findings revealed a significant positive relationship between Communicativeness enabled by LMS and perceived ease of use of LMS, Perceived ease of use and perceived usefulness, perceived ease of use and attitude towards LMS, perceived usefulness and attitude towards LMS and lastly between attitude towards LMS and behavioural intentions to use LMS. A significant model fit was obtained for the model when analyzed from both AMOS 24.0 and SmartPLS3.

Therefore, findings reveal that Communicativeness enabled by LMS plays a significant role in the acceptance of LMS by the students at an Indian university.

Keywords: LMS, TAM, Communicativeness enabled by LMS, SEM, AMOS, SmartPLS3

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CHAPTER 1: INTRODUCTION

1.1 Learning Management System

The changing face of education and technology has spawned a slew of new ideas, and today's best educational technologies present a plethora of options to select from. The fundamental goal of such technologies is to get students involved and figure out the best way to utilize the available technology resources and thus enhance student learning. One such innovation that is bringing education to the next level is the Learning Management System.

A learning management system (LMS), also known as Course Management System (CSM), is a software that is used to manage, track, report on, automate, and deliver educational courses, training programmes, and learning and development programmes. E-learning gave birth to the idea of a learning management system (LMS). Its development started in the 1990s, and ever since, it has been growing. LMSs were designed to identify training and learning gaps, utilizing analytical data and reporting. They are primarily focused on online learning delivery, but they can be used for a variety of purposes, including serving as a platform for online content, such as asynchronous and synchronous courses. In higher education, an LMS may provide classroom management for instructor-led teaching or a flipped classroom ((*Learning Management System*, 2020). To enhance the effectiveness, accessibility and flexibility of the learning process, various types of LMSs have been integrated by an increasing number of universities across the globe. Such integration enables the course instructor to incorporate the course learning material with LMS to achieve a practical and interactive online learning environment. This allows the students to access the course content in different formats and interact with the instructor and other students via chats, forums, video conferences, and other communication tools. A study by Piotrowski (2010) suggests that the use of e-learning platforms at educational institutions assists the creation, organization, delivery, communication, collaboration and assessment of the learning process.

1.2 LMS in India

As a result of the digital revolution, India's educational system is undergoing a significant transformation. Due to the apparent rapid expansion of internet technology and its broad range of applications, the use of LMS in the Indian education system has become a viable and cost-effective choice. The surge in the adoption of LMS in educational institutes across India can be

seen as a result of shifting to a completely online mode of education during the COVID-19 pandemic. To tackle the significant investment problems and infrastructure problems, the majority of the reputed institutions in India prefer the Open Source LMS, i.e. anyone can use, copy, analyses and modify the software in any way they prefer, and the source code is publicly shared so that users are encouraged to improve the design of the software voluntarily. There are several Open Source LMS that offers dynamic and scalable eLearning platform while not exceeding the Learning budget:

1. Moodle
2. Chamilo
3. Open edX
4. Totara Learn
5. Canvas
6. Forma
7. Effectus

1.3 Purpose of the current research

Although, following the global trend and facing the need of the hour, most Indian universities have adopted open-source LMS. However, the utilization of LMS in India is still a matter of concern. Even if colleges spend a lot of money and resources to implement LMSs, these systems will not be properly utilized if users do not embrace and use the system. When users are faced with a new e-learning mode, they must embrace it; their perceptions of how to use and accept an e-learning system might influence its adoption and utilization.

Thus, this study aims to explore the acceptance of LMS within the context of India. The study utilizes Technology Acceptance Model (Davis, 1989) to understand the students' acceptance of an LMS in an Indian University. Apart from the existing TAM constructs, the investigation also included one external variable, communication enabled by LMS, to study the LMS acceptance by the students. In addition to this, the present study employs both Amos 24.0 and SmartPLS3 to develop and analyze the model developed in the current research.

CHAPTER 2: REVIEW OF LITERATURE

2.1 LMS in e-Learning

The rapid advancement in eLearning technology is shaping teaching and learning activities. Learning results, such as increased learning satisfaction and success (Eom, 2014), improved higher-order thinking skills (Hedberg, 2006) and learning motivation (Groff, 2013), have received a lot of research attention in the field of eLearning.

Research by Back et al. (2016) studied how medical students used an LMS and its e-Learning tools. The results concluded that the contents of the LMS facilitate effective learning. For students, tool interactivity and their conceptual integration into face-to-face teaching were important. In addition, LMS was particularly significant for course organizational purposes and the provision of learning materials.

The aim of the research by M. & Kholifah N. Rabiman R (2020) was to create an LMS based eLearning system that can be tested on Microteaching in the Mechanical Engineering Education class. The researchers used the Hannafin and Peck approach model with specific phases as the research method. The assessment was based on various factors like LMS usability, LMS features, visual communication, learning design, language & communication. The findings of this investigation revealed that using an LMS improves learning satisfaction and quality.

Firat (2016) conducted a study to investigate how undergraduate students' learning habits affected their academic performance. As a part of the methodology, learning analytics was used to evaluate the students' online learning habits in LMS for 14 weeks, and the relation between their behaviours and academic achievements was evaluated. This was followed by an analysis of their perspectives on the impact of LMS on their academic achievement. The findings indicated that students used LMS more intensively to help for face-to-face education on course days and activated the content element the most. Lastly, most students confirmed that LMS helped them improve academic achievement only when they included features like efficacy and interactivity.

Another study by Venugopal & Jain (2015) investigated the influence of LMS on student engagement in a blended learning environment. Results indicated a positive correlation between student engagement and the use of LMS. In addition, a strong positive correlation was also found

between the presence of various modules of the LMS in a course and the use of LMS by the students off-campus.

An exploratory study by Hamane (2020) aimed at studying student engagement in an online course and its impact on student success. The type and strength of the relationships were determined using correlation and regression. The results revealed a moderate positive relationship between students' perceived level of engagement and actual level of engagement, students' perceived level of engagement and student success, and student's actual level of engagement and students' success.

2.2 TAM in the context of eLearning/ LMS

Web-based LMSs are being used in many universities and firms, but their adoption requires a solid understanding of the user acceptance processes. Various researchers have long studied the lack of technology acceptance by users in terms of various technologies.

Davis et al. (1989) pioneered the research in this area. His research addressed why users accept or reject information systems and how user acceptance is affected by system design features. Based on his investigations, he developed one of the most influential technologies acceptance models- The Technology Acceptance Model. According to TAM, two primary factors influence an individual's intention to use new technology: Perceived ease of use and perceived ease of usefulness.

The assessment of inherent features of IT, such as ease of use, ease of learning, adaptability, and clarity of its interface, is referred to as perceived ease of use. The amount to which a user believes that adopting a certain system will improve his or her work performance is described as perceived usefulness. (Venkatesh et al., 2003).

A systematic review by Šumak et al. (2011) showed that TAM is the most common theory in existing e-learning acceptance research, with 86% of the studies using TAM as the basis for their investigations. Furthermore, the convenience of implementing TAM in e-learning acceptance research also has been confirmed by many other researchers (Emmett, 2011; Rodriguez & Lozano, 2012); TAM is thus adopted for this study as a ground theory.

In a study by Joo et al. (2016), data from a Korean online university was collected to study integrated relationships among their perceived ease of use, perceived usefulness, expectation-confirmation, satisfaction, continuance intention and actual usage of m-LMS. Findings revealed that perceived ease of use predicted perceived usefulness.

Liaw et al. (2007) through their study explored the instructors' and learners' attitude towards using e-learning. The results demonstrated that behavioural intention to use e-learning is influenced by perceived usefulness and self-efficacy.

The significance of perceived ease of use and perceived usefulness in determining the students' attitude towards WebCT usage has been established by (Ngai et al., 2007a) in their study regarding user acceptance of WebCT.

The study by Juhary (2014) aimed to investigate students' perceptions regarding LMS usage at the Defense University of Malaysia. The study hypothesized that perceived usefulness would significantly impact attitudes toward using LMS, that perceived ease of use would significantly impact attitudes toward using LMS, and that students' attitudes toward using LMS would have a significant impact on users' behavioural intentions. The results of the investigation supported the proposed hypotheses.

The results of various other studies (Sánchez & Hueros, 2010; Šumak et al., 2011) reveal the importance of perceived ease of use and perceived usefulness in e-learning modalities.

2.3 Communication and eLearning

Even though perceived ease of use and perceived usefulness are considered to be the primary factors for a user to accept and use IT, other factors also affect the users' acceptance of a technology (Moon & Kim, 2001)For example, the communication of e-learners is an essential predictor of course effectiveness, learner satisfaction and LMS acceptance.

As suggested by (Piccoli et al., 2001), effective communication allows learners to evaluate their course progress and instructional needs. Furthermore, studies have found that frequent communication between instructors and learners can reduce psychological distance, increasing learners’ perceived satisfaction.

Wan et al. (2008) found that students who were more experienced in seeking information and communicating via ICT had higher levels of virtual competence. Thus, maybe frequent use of ICT for these activities helped individuals develop the capabilities to perform in a virtual environment.

According to Paechter et al. (2010) & Wan et al. (2008) students may learn effectively, but they may be dissatisfied since the e-learning course's format and communicativeness did not meet their ICT experience expectations.

Damnjanovic et al. (2015) conducted research to determine the factors that influence Moodle's efficacy from the perspective of students. In the initial theoretical framework, eight factors (BI, Communicativeness, Format, Information Quality, Performance Outcome, Perceived Usefulness, Satisfaction, and System Quality) were defined. The findings revealed that. Results indicated that Communicativeness had the highest significant impact on performance outcome.

A study focusing on factors affecting students' perceptions of learning outcomes with Moodle by Pérez-Pérez et al. (2020) confirmed a positive effect of Communicativeness on students' perceptions of learning outcomes, thus adding support to the scarce previous empirical evidence on this issue.

A study was conducted to explore the role of interaction factors, intrinsic motivator and extrinsic motivators (PEOU & PU) in determining nurses' intention to use the e-learning system. Three types of interaction factors were presented in the study- learner system interaction, instructor-learner interaction and learner-learner interaction. The study included CFA and SEM as part of its research methodology. The results revealed that all three types of interactions had significant effects on PU and PEOU (Cheng, 2013).

Results of a longitudinal study by Cheng (2013) revealed that interaction factors (controllability, responsiveness, two-way communication, and personalisation) and user experience had an indirect effect on students' intention to use an e-learning system via extrinsic motivators, such as perceived ease of use and perceived usefulness, and the intrinsic motivator (perceived enjoyment).

2.4 LMS in India

A study by Gulzar & Leema (2016) revealed that even though India's internet usage growth rate is the second-highest in Asia at 28%, only 6% of Indian universities use LMS for e-learning purposes.

Though the dependence on LMS for e-learning has surged significantly during the COVID-19 pandemic, relatively scarce research exists in the area. The current research work, though relatively more minor, focuses primarily on the usage of the system by the instructors (Sharma et al., 2017), benefits of LMS in Indian education (Kulshrestha, 2013), infrastructure, connectivity and lack of instructor experience in LMS usage (Ahuja & Bala, 2021) technology usability, stand of Indian modern education concerning modern means of e-learning tools available in the market (Gulzar & Leema, 2016), instructors' satisfaction, PU and PEOU (Khushwaha, Mahajan, Attri, & Misra, 2020) continuous usage of LMS (Sharma, Gaur, Saddikuti, & Rastogi, 2017).

CHAPTER 3: RESEARCH GAP, MOTIVATION, OBJECTIVE, THEORETICAL BACKGROUND, HYPOTHESES

3.1 Research Gap

Earlier research works have primarily investigated the usage and acceptance of LMS by instructors in India. Although scarce, there exists research in the area of LMS usage by Indian Students. Nevertheless, there has been relatively little research into the relationship between Indian students' acceptance of LMS and external factors, such as communication enabled by LMS. Furthermore, the recent adoption of open source LMS by the Thapar Institute of Engineering and Technology necessitates investigating the system's acceptance from the students' perspective.

In addition, the majority of the existing research in the area of acceptance of LMS has dependent on the software AMOS for Structural Equation Modeling.

The present study thus focuses on extending the TAM model in the context of LMS by establishing Communicativeness as a critical external factor underlying the acceptance of LMS by the students. It also focuses on utilizing both AMOS 24.0 and SmartPLS3 for establishing the fit for the developed model. Thus, through the current investigation, the study attempts to build a

conceptual framework that will uncover the factors underlying LMS acceptance by students at an Indian university.

3.2 Motivation of the Study

There exist various frameworks that explain the acceptance of Learning Management Systems by the students. However, no such framework considers Communicativeness enabled by the LMS as an underlying factor determining its acceptance by the students. Though being used in the Indian education system, LMS still were not an essential part of the system until recently. The surge in the acceptance of various LMSs by the Indian universities was primarily a consequence of a complete shift to an online mode of education during the COVID-19 pandemic. The sudden shift to the LMS led to the exploration of a relatively new way of education, both for the instructor and the students. Thus, the primary motivation of the study is to identify the factors that affect students' LMS acceptance and extend the TAM in the context of e-learning. Therefore, to make more effective use of LMSs, the study intends to determine the learners' perceptions of acceptance towards these systems at an Indian university.

3.3 Objective

1. To design a conceptual framework for understanding the factors underlying the acceptance of LMS at TIET.

3.4 Theoretical Background

3.4.1 Technology Acceptance Model (TAM)

The TAM (technology acceptance model) is a framework that considers both cognitive and psychological elements of technology use (Venkatesh et al., 2003). This model aims to explain both individual acceptance and the factors that impact acceptance of a technology.

The technology acceptance model (TAM) is a framework that includes cognitive and psychological aspects of technology use (Venkatesh, Morris, Davis, & Davis, 2003). This model seeks to explain individual acceptance of a technology as well as the factors that influence acceptance.

The TAM is the most prominent and commonly used model in studies on computer and internet technologies among the several models that explain technology acceptance. It was created by

Davis (1989) to assess users' willingness and intention to utilize technology based on three factors: perceived utility, perceived ease of use, and behavioural intents to use (Sezer & Yilmaz, 2013).

Using the “Theory of Reasoned Action” developed in social psychology by Ajzen (1975), Davis et al. (1989) proposed the Technology Acceptance Model (TAM) specifically for explaining the acceptance and usage of information technologies. The model uses a 4-stage process in which:

i. External variables (communication in the present study) influences user beliefs (perceived ease of use and perceived usefulness) about using the technology.

ii. User beliefs in turn influence user attitudes about using the system

iii. Users’ attitude, further, influences users’ intention to use the system

iv. User intention determines the system’s level of use.

Thus, the model allows the researcher to gauge the success or failure of LMS.

The following are the main TAM concepts:

PEOU: Perceived Ease of Use- the degree to which a person believes that using a particular system would be free of effort.

PU: Perceived Usefulness: the level to which a user believes that using a particular system would enhance his/her performance

ATU: Attitude: refers to the level to which the user has either a positive or a negative evaluation for a particular system.

BI: Behavioral Intentions- the extent to which a person has made a conscious decision to engage in or refrain from engaging in a specific future behaviour.

According to the TAM, external and context-dependent variables influence the two key determinants, i.e. PEOU and PU.

A systematic review of 22 papers from six journals by Legris et al. (2003) indicated that only 60% of TAM studies considered external variables and that there was "no consistent trend with

respect to the choice of the external variables considered." Therefore, the researchers argued that studying external variables is necessary because they are the ultimate usage drivers.

The results of a study by Jones & Hubona (2006) investigating the mediation of external variables in the TAM revealed that the internal TAM model (effect of beliefs on usage) was consistent across technologies; however, the effect of external variables on TAM's belief constructs appeared to be dependent upon on the nature of technology and the external variable considered. Therefore, the external variables should be studied more systematically.

According to the existing research work on e-learning acceptance, PEOU has the most impact on PU. Perceived usefulness is also an important factor in BI (behavioural intentions). PU and PEOU have the greatest favourable impact on attitude (A).Various researches have supported the validity of the TAM model through a wide range of information systems (Moon & Kim, 2001) for example, in the e-mail (Gefen & Straub, 2000; Szajna, 1996) 1996), e-collaboration (Dasgupta, Granger, & McGarry, 2002), Websites (Koufaris, 2002), online shopping intentions (Heijden, Verhagen, & Creemers, 2003).

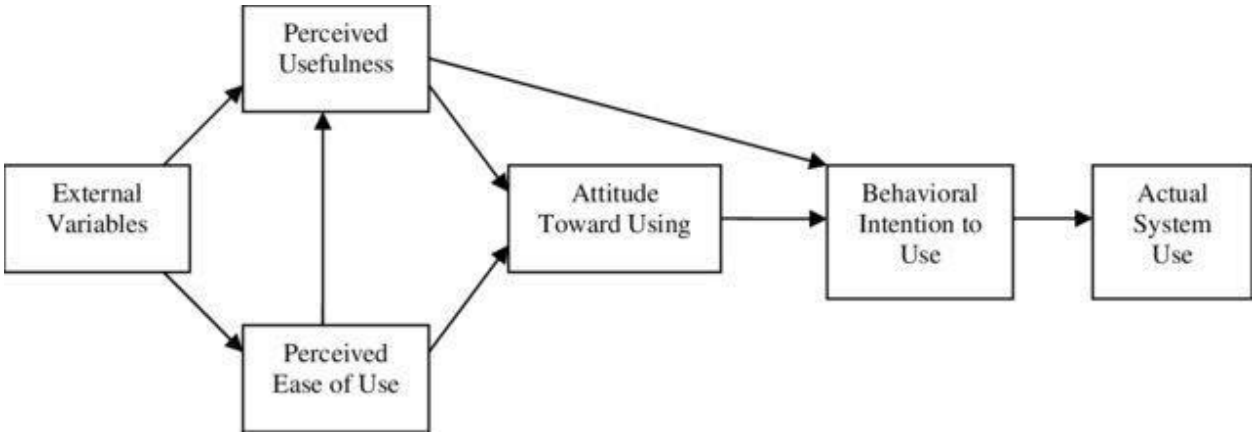

Figure 1: TAM by Davis (1989)

3.4.2 Self-efficacy theory

Bandura's (1982) research on self-efficacy supports the importance of perceived ease of use. Self-efficacy, defined as "judgments of how well one can execute courses of action required to deal with prospective situations", is similar to perceived ease of use in the sense that perceived ease of use refers to the degree to which the individual considers that the usage of a particular technology does not entail extra effort.

The "outcome judgment" defined as the extent to which a behaviour, once successfully executed, is believed to be linked to a valuable outcome. Bandura's outcome judgment is similar to perceived usefulness. Thus, the self-efficacy research suggests that perceived ease of use and perceived usefulness function as primary determinants of user behaviour (Davis, 1989)

3.4.3 Cost-benefit paradigm

Another concept relevant to perceived usefulness and perceived ease of use is Cost-benefit analysis (CBA), sometimes also called benefit-cost analysis. It is a method for analyzing the strengths and weaknesses of alternatives to find the optimal way to get benefits while retaining savings. It can be used to compare completed or planned courses of action and estimate the value of a decision, project, or policy concerning its cost. There are two primary applications for CBA: and 2. To provide a basis for weighing up investments (or decisions), comparing the total expected cost of each option with its total expected benefits. Research by Beach & Mitchell, (1978); Johnson & Payne (1985) & Payne (1982) explains people's choice among various decision-making strategies regarding a cognitive trade-off between the effort required to employ the strategy and the quality (accuracy) of the resulting decision. The distinction made herein between PU & PEOU is similar to the distinction between subjective decision-making performance and effort.

3.4.4 Communicativeness

Communicativeness is one of the significant factors identified in the acceptance of e-learning environments. There are two principal online communication strategies. First is the strategy designed to facilitate teacher-student communication, and the other is the strategy aiming to facilitate student-student communication (Chan et al., 2011). Jeschke & Vieritz (2007) study on eLearning environments concludes that e-learning has two advantages in terms of interaction and presentation adaptation. Furthermore, Kember et al.(2010) investigated how educational website design influences student learning results in blended learning environments.

Prior studies have investigated the relationship between PEOU, PU, A and BI, ignoring Communicativeness enabled by the LMS, one of the significant factors underlying LMS acceptance by students. Therefore, it would be considered a salient determinant of the users' acceptance and use of LMS. In the present study, Communicativeness enabled by an LMS is thus employed for extending the model of TAM.

In TAM, two variables: PEOU & PU, affect the attitude and behavioural intention of the users. PEOU positively affects PU; perceived usefulness and perceived ease of use positively affect attitude toward using; perceived usefulness and attitude toward using positively affect intention to use. Several studies have confirmed the causal relationship between these variables (Davis, 1989; Hsu & Chang, 2013; Moon & Kim, 2001; Venkatesh et al., 2003). Studies done by C. S. Ong et al. (2004), Yoon & Kim (2007) found PEOU had a positive impact on intention to use.

The following model is proposed to illustrate these relationships:

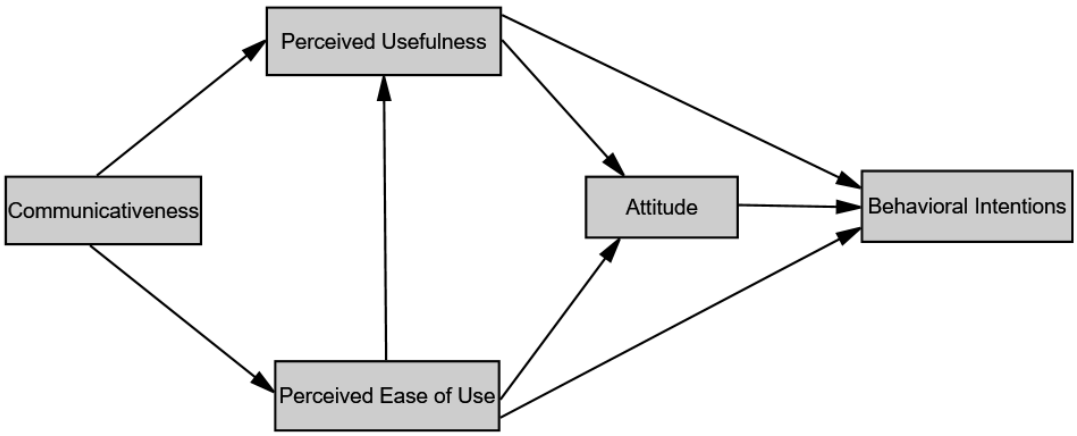

Figure 2:The general proposed pathway between PEOU, PU, C, ATU and BI

3.5 Hypotheses

Based on the above path model, the following hypotheses are proposed:

H_1: The Communicativeness enabled by the LMS will have a positive effect on the perceived usefulness of the LMS.

H_2: The Communicativeness enabled by the LMS will have a positive effect on the perceived ease of use of the LMS.

H_3: Perceived ease of use positively affects the perceived usefulness of the LMS.

H_4: Perceived ease of use positively affects attitude towards using the LMS.

H_5: Perceived ease of use positively affects behavioural intentions to use LMS.

H_6: Perceived usefulness positively affects attitude towards using the LMS.

H_7: Perceived usefulness positively affects behavioural intentions to use LMS.

H_8: Attitude towards using LMS positively affects the behavioural intentions to use LMS.

CHAPTER 4: METHODOLOGY

4.1 Sample: The sample frame was restricted to students that use TIET-LMS at the Thapar Institute of Engineering and Technology, Patiala. At the time of data collection, as a result of the COVID-19 pandemic, all the classes and the assessments were being held online. Therefore, a purposive sampling process produced a sample size of 200 users. The selected participants fell between the age ranges of 18-25 years.

4.2 Design: The study followed an explanatory research design where the relationship between the hypothesized model was discussed. Relationships among the variables were hypothesized based on a thorough investigation of the existing literature and theoretical background.

4.3 Procedure:

4.3.1 Instrument Development: An online questionnaire, using Google Forms, with 42 questions was used to collect the data. The participants' informed consent was acquired at the start of the e-survey. The following two sections comprised the questionnaire:

Questions regarding the age, gender and course of the respondent

Measures of the TAM construct, i.e. PEOU, PU, C, ATU & BI. (Appendix A)

The TAM items were measured on a 5-point Likert- scale from "1" "strongly disagree" to "5" "strongly agree". All the items for the questionnaire were adapted and modified from the previous studies for the present study (Davis, 1989).

A pilot test of the questionnaire was conducted with a random sample of 60 TIET students in order to eliminate measurement error. The results of the statistical analyses, using SPSS 25.0, confirmed strong reliability for all the measuring items.

4.3.2 Statistical Analysis

4.3.2.1 Instrument Reliability: To examine the discriminatory power of the items on the scale and their power to predict the total score, corrected item-total correlation was calculated. Corrected item-total correlation of .4 and above was used as the basis for determining the discriminatory power of the items on the scale. Items having a discriminatory index of less than .4 were deleted from the scale, and the remaining items were again analyzed to determine the discriminatory index.

To determine internal consistency reliability, which refers to the extent to which a measure is a consistent measure of a concept- of the scale, Cronbach's alpha was calculated. Given that the reliability coefficients of .70 and above are considered to indicate reliable measurement (Fornell & Larcker, 1981), reliability coefficients for all the five subscales of the LMS acceptance scale were analyzed according to the same criteria.

SPSS 25.0 was used to determine the instrument reliability.

4.3.2.2 Instrument Validity: To examine the construct validity of the questionnaire, its convergent validity was calculated using SPSS 25.0. The underlying idea is that related construct's tests should be highly correlated.

For this purpose, the LMS acceptance scale (LMSAS) developed by Sezer & Yilmaz (2013) was administered to the initial sample of 60 students. The LMSAS consists of 21 items. It ranges from 'strongly disagree' to 'strongly agree'. Higher scores on the scale suggest that students are more accepting of the LMS. The scale poses as a valid and reliable tool to measure the students' acceptance of LMS.

4.3.2.3 Structural Equation Modeling: The data collected from the e-survey used Structural Equation Modeling (SEM) for establishing the relation between the five variables, i.e. C, PEOU, PU, ATU & BI. For SEM analysis, the present research employed both SmartPLS3 and AMOS 24.

i. **PLS-SEM:** Partial least squares (PLS) is an alternative to covariance-based SEM. It is also known as "composite-based SEM", "component-based SEM' or "variance-based SEM". PLS can be implemented both as a regression model as well as a path model. It is described as a technique that is best suited for prediction or exploratory modelling in research. However, when confirmatory modelling is the aim of the study, covariance-based SEM is favoured. The present study uses the SmartPLS3 software to establish the proposed path model. The benefits of PLS-SEM can be summed up in three genuine characteristics (Henseler, Ringle, & Sinkovics, 2009):
    1) It allows for the computation of the cause-effect relation model for both reflective and formative measurement models without restrictions (Diamantopoulos & Winklhofer, 2001)
    2) In cases where sample sizes are small, it can be used to estimate the path models (Chin & Newsted, 1999).
    3) The PLS path models can be highly complex, with many latent and manifest variables, without causing estimation issues (Hellberg, Wold, Dunn III, Gasteiger, & Hatchings, 1985).

ii. **CB-SEM:** Covariance Based SEM is a flexible and compelling data analysis method, particularly with a reflective measurement where hypothetical constructs are estimated as common factors presumed to trigger their indicators, i.e. observed/ manifest variables. The present study uses the AMOS 24.0 software to establish the proposed path model.

CHAPTER 5: RESULTS

5.1 Instrument Development

5.1.1 Reliability

Table 1: PEOU Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.885	.885	11

Table 2: PU Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.945	.946	9

Table 3: C Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.837	.835	11

Table 4: A Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.931	.936	6

Table 5: BI Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.930	.931	4

Reliability

Cronbach's coefficient alpha was found to be .885 for PEU (Table 1), .945 for PU (Table 2), .837 for C (Table 3), .936 for A (Table 4) and .930 for BI (Table 5).

5.1.2 Convergent Validity

Table 6: Convergent Validity

		LMS AS	CONV
LMS AS	Pearson Correlation	1	.873**
	Sig. (2-tailed)		.000
	N	60	60
CONV	Pearson Correlation	.873**	1
	Sig. (2-tailed)	.000	
	N	60	60

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

Correlation coefficient was found to be .873 for convergent validity.

5.2 PLS- SEM

5.2.1 Measurement Model

Table 7: Composite Reliability, Cronbach's alpha & AVE

Factor	Composite reliability	Cronbach's alpha	AVE
ATU	0.959	0.942	0.853
BI	0.953	0.935	0.837
C	0.892	0.850	0.624
PEOU	0.895	0.843	0.680
PU	0.949	0.937	0.725

Table 7 elucidates the values of the measures for the convergent validity. All the values of composite Reliability & Cronbach's alpha are greater than the cut-off value of .8. In the above table, the AVE for all the five latent variables came out to be greater than the .5 cut off.

Table 8:Outer Loadings

	A	BI	C	PEOU	PU
A1	0.921				
A2	0.943				
A3	0.912				
A6	0.918				
BI 1		0.908			
BI 2		0.921			
BI 3		0.917			
BI 4		0.913			
C6			0.796		
C7			0.799		
C9			0.788		
C10			0.857		
C11			0.725		
PEOU6				0.805	
PEOU7				0.857	
PEOU8				0.837	
PEOU11				0.800	
PU1					0.860
PU2					0834
PU3					0.891
PU4					0.837
PU7					0.857
PU8					0.807
PU9					0.873

Table 8 demonstrates the measurement loadings. Measurement loadings are the standardized path weights connecting the factors to the indicator variables. The loadings vary from 0 to 1. The values given in the above table surpass the cut-off value of 0.7.

Table 9:The Fornell- Larcker Discriminant Validity

	ATU	BI	C	PEOU	PU
ATU	**0.923**				
BI	0.823	**0.915**			
C	0.287	0.359	**0.790**		
PEOU	0.744	0.577	0.442	**0.825**	
PU	0.873	0.798	0.266	0.702	**0.851**

Table 9 elucidates the discriminant validity values of the model. The top numbers (square root of AVE) in each of the factor columns came out to be greater than the numbers below it (correlations).

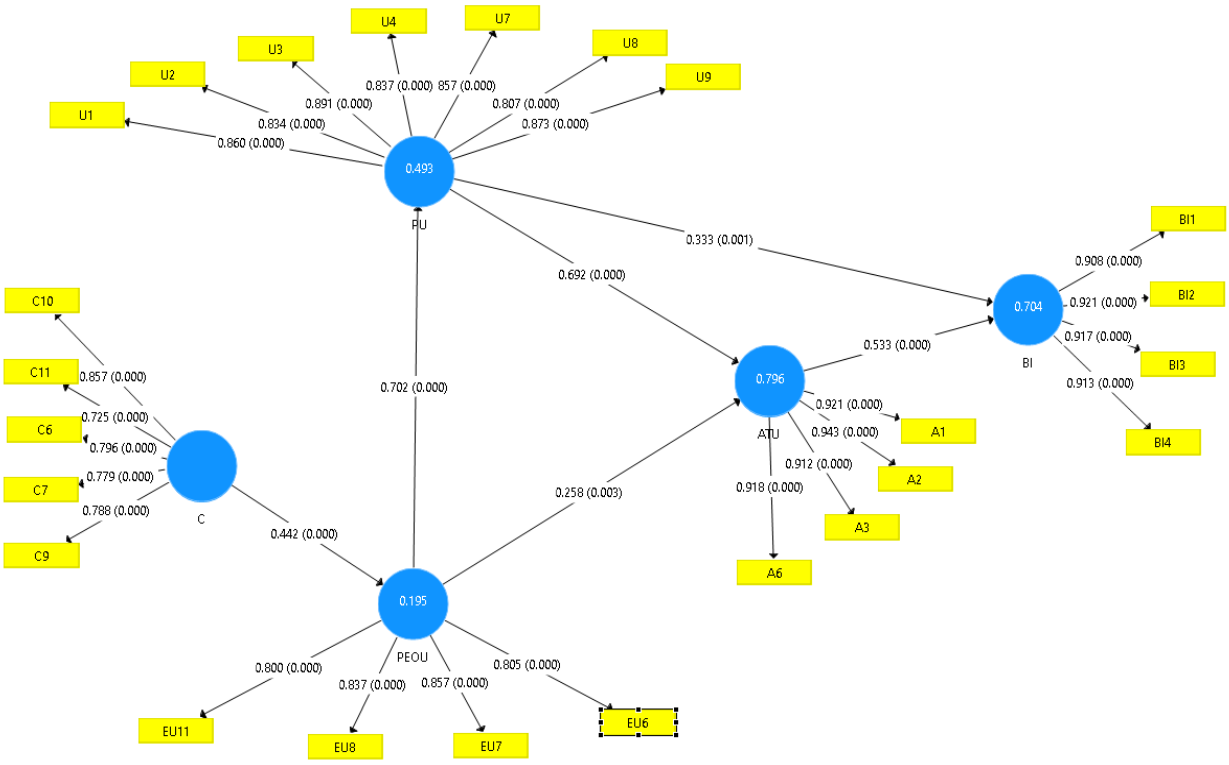

Figure 3: PLS-SEM Measurement Model

5.2.2 The Structural model

Table 10:Path coefficients

	ATU	BI	C	PEOU	PU
ATU		0.533			
BI					
C				0.442	
PEOU	0.258				0.702
PU	0.692	0.333			

Table 10 elucidates the path coefficients for the inner model. Since path coefficients are standardized therefore the path weights may vary from -1 to +1, with paths closest to absolute 1 reflecting strongest paths and weights closest to 0 representing the weakest paths.

Table 11:R^2

	R^2	T Statistics	p Values
ATU	0.796	24.453	0.000
BI	0.704	13.726	0.000
PEOU	0.195	2.216	0.027
PU	0.493	6.547	0.000

Table 11 shows the R^2 value for the endogenous latent variables. The R- square value for ATU, BI, PEOU & PU came out to be 0.796, 0.704, 0.195 & 0.493 respectively.

Table 12: Model fit- SRMR

	Saturated Model	Estimated Model
SRMR	0.067	0.071

The standardized root mean square residual (SRMR) measures the difference between the observed correlation matrix and the model implied correlation matrix. From Table 12, it can be observed that the SRMR value for the current model came out to be 0.071.

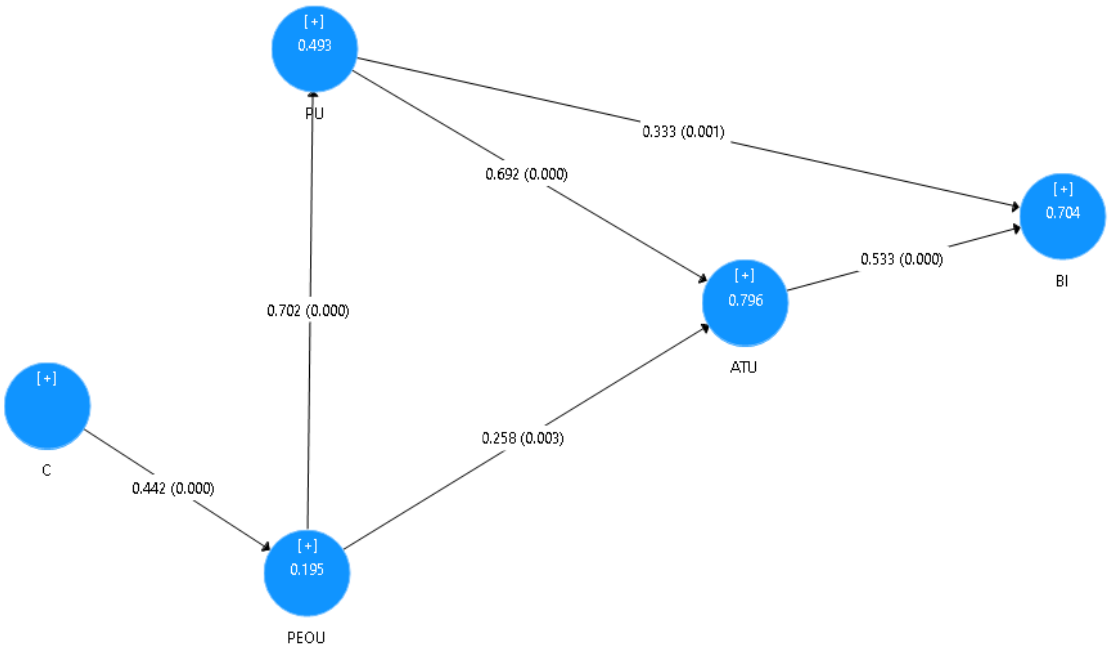

Figure 4: PLS-SEM Structural model

5.3 CB-SEM

5.3.1 Measurement Model

Table 13: Factor Loadings

Construct	Item	Factor loading
C	C6	.851
	C7	.854
	C8	.800
	C9	.807
	C10	.811

	C11	.766
PEOU	PEOU6	.718
	PEOU8	.740
	PEOU9	.668
	PEOU11	.744
PU	PU3	.814
	PU6	.767
	PU7	.794
	PU8	.810
	PU9	.852
ATU	ATU1	.882
	ATU3	.883
	ATU4	.595
	ATU5	.875
	ATU6	.916
BI	BI 1	.817
	BI 2	.865
	BI 3	.853
	BI 4	.925

Table 13 elucidates the factor loadings for the LMS acceptance scale. Every item possessed a factor loading of 0.7 and above.

Table 14: Model fit summary

Fit index	Recommended value	Measurement model
CFI	>0.80	.940

RMSEA	<0.08	.073
NFI	>0.80	.848
NNFI/ TLI	>0.90	.930
PNFI	>0.60	.722

Table 14 provides a summary of the estimated fit indices for the final measurement model.

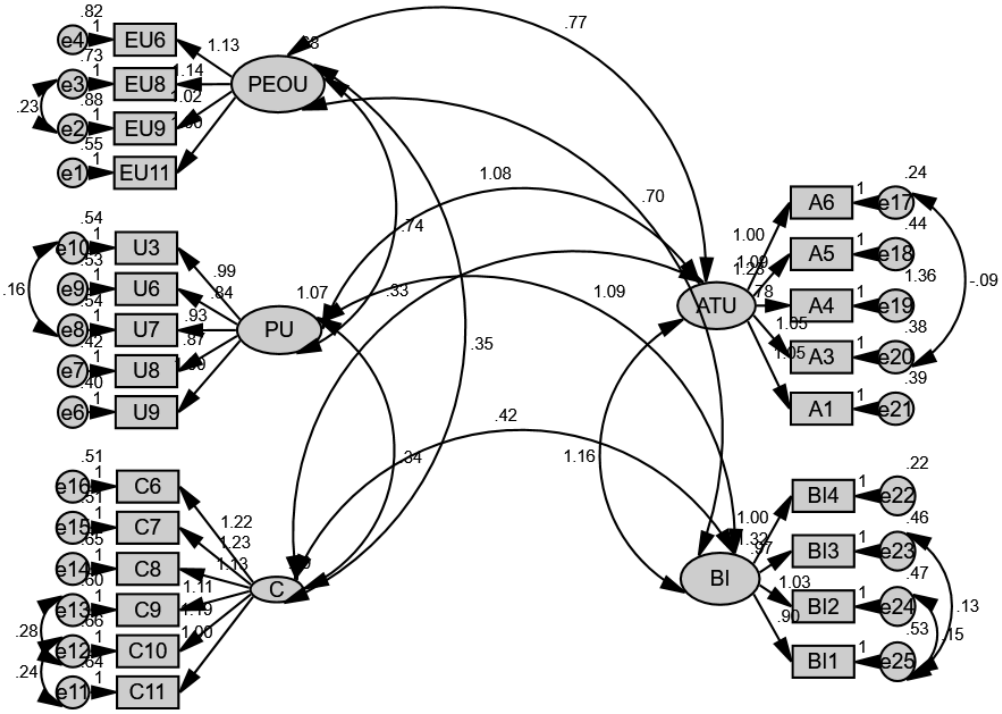

Figure 5: CB-SEM Measurement model

5.3.2 Structural model

Table 15: Model fit summary

Fit index	Recommended value	Structural model
Chi-square	Non-significant	4.497
Degrees of Freedom (df)	n/a	4

p		.343
GFI	>0.90	.982
AGFI	>0.80	.932
CFI	>0.80	.999
RMSEA	<0.08	.035
NFI	>0.80	.987
NNFI/ TLI	>0.90	.996

Table 15 provides the model fit indices for the final structural model.

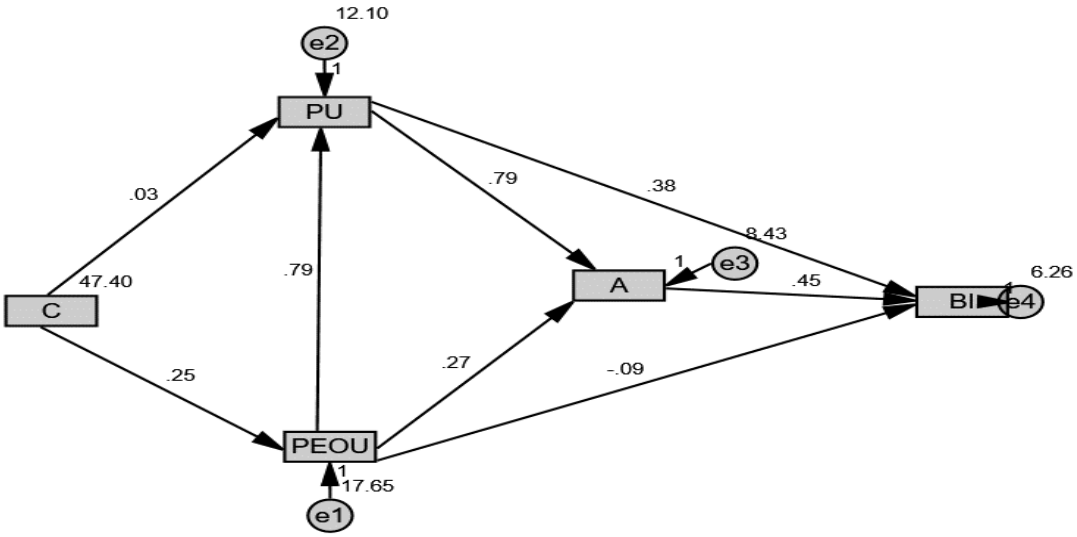

Figure 6: CB-SEM Structural model

5.4 Hypotheses testing results

Table 16 Hypotheses testing results

Hypotheses	Effects	PLS- SEM	CB- SEM	Remarks
H_1	C→ PU		.03	Not supported
H_2	C→ PEOU	.44	.25	Supported
H_3	PEOU→ PU	.70	.79	Supported
H_4	PEOU→ A	.25	.27	Supported
H_5	PEOU→ BI		-.09	Not supported
H_6	PU→ A	.69	.79	Supported
H_7	PU→ BI	.33	.38	Supported
H_8	A→ BI	.53	.45	Supported

CHAPTER 6: DISCUSSION

LMSs are used in traditional education as distance learning tools, e-learning tools at higher education institutions, and or-learning tools to supplement traditional education (Dutta et al., 2013). The use of LMSs in higher education promotes student motivation and attention. It provides a more adaptable learning environment, and allows for better administration of the learning/teaching process. (Corbeil & Valdes-Corbeil, 2007; Zoraini Wati Abas et al., 2009). Thus, the students must accept and use this technology to seek all these benefits.

A systematic review by Šumak et al., (2011) showed that TAM is the most common theory in existing e-learning acceptance research, with 86% of the studies using TAM as the basis for their investigations. The convenience of implementing TAM in e-learning acceptance research also has been confirmed by many other researchers (Emmett, 2011; Rodriguez & Lozano, 2012). TAM was therefore adopted for this study as a ground theory. The model had four primary constructs- PEU, PU, A and BI. An external construct of Communicativeness enabled by LMS was added based on existing literature.

A literature review shows that there is relatively little research into the relationship between Indian students' acceptance of LMS and external factors, such as communication enabled by

LMS. Furthermore, the recent adoption of open source LMS by the Thapar Institute of Engineering and Technology necessitates investigating the system's acceptance from the students' perspective.

In addition, the majority of the existing research in the area of acceptance of LMS has dependent on the software AMOS for Structural Equation Modeling.

The present study thus focused on extending the TAM model in the context of LMS by establishing Communicativeness as a critical external factor underlying the acceptance of LMS by the students. It also focused on utilizing both AMOS 24.0 and SmartPLS3 for establishing the fit for the developed model. Thus, through the current investigation, the study attempted to build a conceptual framework that will uncover the factors underlying LMS acceptance by students at an Indian university.

6.1 Instrument development

6.1.1 Reliability

In the present research, five subscales (PEU, PU, C, A & BI) were included in the LMS acceptance scale. The discriminatory power and the internal consistency were established for each of the five subscales.

Perceived Ease of Use (PEU)

The degree to which a person believes that using a given system would be painless is referred to as PEU. In the current research (Table 1), the PEU subscale comprised a total of 11 items. Cronbach's coefficient alpha was found to be .885, and the Corrected item-total correlations were found to vary between .436 and .762 for the PEU dimension. Since all the items had a discriminatory power of .4 and above, all the items were retained in the final version of the scale.

Perceived Usefulness (PU)

The degree to which a person believes that employing a certain system would improve his or her job performance is referred to as PU. 9 items were included in the PU subscale. The coefficient alpha for the dimension came out to .945. The discriminatory index varied between .706 and

.855; thus, all the items from the subscale were retained in the final version of the scale. (Table 2)

Communicativeness (C)

Communicativeness refers to the communication that is enabled by a system/ technology. Communicativeness is enabled by LMS using the features such as chats, discussion, forums, feedbacks, surveys, etc. Initially, 11 items were used in the subscale, having a coefficient alpha of .837; however, the corrected item-total correlation for the C dimension varied between .169 and .766. Therefore, the three items (item 1, 2 and 5) having corrected item-total correlation of .169, .361 and .110 were removed from the measure and the item total statistics were again analyzed for the C dimension. After removing the 3 items the corrected item-total correlation for the C dimension varied from .504 to .784. (Table 3)

Attitude (A)

Attitude is the degree to which the user is interested in a system, and it has a direct effect on the intention to use the system in the future (Bajaj & Nididumolu, 1998). The subscale comprised of 6 items and the coefficient alpha was found to be .931. The discriminatory power of the items in the attitude subscale varied from .624 and .878 thus all the items were included in the final LMS acceptance scale. (Table 4).

Behavioural Intentions (BI)

BI refers to the motivational factors that influence a given behaviour where the stronger the intention to perform the behaviour, the more likely the behaviour will be performed. 4 items were included in the BI subscale. Cronbach's coefficient alpha was found to be .930 and the Corrected item-total correlations were found to vary between .818 and .869 for the dimension. (Table 5)

The results of this study suggest that the scale can be regarded as a measure that generates reliable measurements of students' acceptance of the LMS developed by TIET.

6.1.2 Validity

A correlation coefficient of .873 was found for convergent validity (Table 6). Thus, establishes the scale as a valid measure of students' acceptance of LMS at TIET.

6.2 PLS-SEM

After establishing the reliability and validity of the LMS, the measurement model followed by the structural model were examined.

6.2.1 Measurement model assessment

Internal consistency (as established by composite and indicator reliability), convergent validity (established by average variance extracted), and discriminant validity are all evaluated as part of the measurement model evaluation. In the present investigation, Cronbach's alpha and the composite reliability were used as the measure of internal consistency. According to Nunnally & Bernstein (1994), an internal consistency value above 0.7 is regarded as satisfactory. For each of the five factors (PEOU, PU, C, A, BI) in the current study, composite reliability and the Cronbach's alpha are higher than or equal to 0.7 (Table 7) and therefore, we can conclude that the items designed to each of the factors are consistent and well-designed.

Since the reliability of the indicators varies, therefore, the reliability of each indicator should be assessed. According to the researchers, a latent variable should explain a significant portion of each indicator's variance (usually at least 50%). As a result, each factors' factor loading should be higher than 0.7. In the present study, the latent variables explain more than 50% of their corresponding indicators (Table 8). Hence, it can be concluded that the indicators are reliable.

Average Variance Extracted (AVE), as Fornell & Larcker (1981) suggested, is used as a criterion for determining the convergent validity of the indicators. A convergent validity value of at least 0.5 suggests that a latent variable can explain more than half of the variance of its indicators on average (Götz et al., 2010). The AVE for each latent variable is higher than 0.5 (Table 7), thus explaining more than half of the variance of their corresponding indicators on average and are thus, valid and well-designed.

It postulates that a latent variable shares more variance with its assigned indicators than any other latent variable In statistical terms, the AVE of each latent variable should be greater than the latent variable's highest squared correlation with any other latent variable. Table 9 elucidates

the discriminant validity values of the model. The top numbers (square root of AVE) in each factor column came out to be greater than the numbers below it (correlations), thus establishing significant discriminant validity.

6.2.2 Structural model assessment

The assessment of the structural model includes an estimation of the path coefficients, R^2 of the endogenous variables and the estimates for the goodness of fit indices.

Table 10 elucidates the path coefficients for the inner model. Since path coefficients are standardized, the path weights may vary from -1 to +1, with paths closest to absolute 1 reflecting the strongest paths and weights closest to 0 representing the weakest paths. Thus, it can be concluded that the effect of PEOU on PU is the strongest (.702), followed by the effect of PU on ATU (.692), the effect of ATU on BI (.533) and the effect of C on PEOU (.442). Effect of PEOU on ATU (.258) and effect of PU on BI (.333) can be seen as having the weakest path effects.

R^2, also known as the coefficient of determination, refers to the overall effect size measure of the structural model. R-square values of 0.67,0.33, and 0.19 in PLS path models are described as substantial, moderate, and weak, respectively (Chin,1998). In the present study, Table 11 shows the R^2 value for the endogenous latent variables. From the results, it can be concluded that ATU (0.796) & BI (0.704) exhibit a substantial R^2 value, followed by PU (0.493), which exhibits a moderate R^2 value. Out of all the endogenous variables, PEOU had the least satisfactory coefficient of determination (0.195). Therefore, the general impression is that the current path model explains the satisfactory amount of total latent variance.

The standardized root mean square residual (SRMR) measures the difference between the observed correlation matrix and the model implied correlation matrix. Lower SRMR (< .08) value provides a better model fit. From Table 12, it can be observed that the SRMR value for the current model came out to be 0.071, thus providing a significant model fit.

6.3 CB-SEM

The present study investigates the impact of students' perceived ease of use (PEOU), perceived usefulness (PU), Communicativeness enabled by LMS (C) and their attitude (A) towards LMS on their behavioural intentions to use LMS (BI).

6.3.1 Measurement model

Based on the modification indices provided by AMOS, specific indicators (C1, C2, C3, C4, C5, PEOU 1, PEOU 2, PEOU 3, PEOU 4, PEOU 5, PEOU 7, PEOU 10, PU 1, PU 2, PU 4 and PU 5) were removed from the initial measurement model. Table 13 elucidates the factor loadings for the LMS acceptance scale. Every item possessed a factor loading of 0.7 and above.

It was followed by estimating the overall model fit for the final measurement model. Table 14 provides a summary of the fit indices that were assessed to identify model goodness-of-fit. The estimated values of CFI (.940), RMSEA (.073), NFI (.848), NNFI (.930) & PNFI (.722) have proven the excellent measurement model fit for the data.

6.3.2 Structural model

Table 15 provides a summary of the estimated values of fit indices. They provide a good structural model fit to the data; chi-square (4.497), GFI (.982), AGFI (.932), CFI (.999), RMSEA (.035), NFI (.987) and NNFI (.996).

6.3 Hypotheses testing results

Table 16 provides the summary of the hypothesis testing results.

The first hypothesis in the present investigation postulated that the communicativeness enabled by the LMS would have a positive effect on the perceived usefulness of the LMS. The results show that this hypothesis is rejected. However, the literature suggests that communicativeness strongly influences perceived usefulness (Cheng, 2013; Damnjanovic et al., 2015). The disparity in results can be because the current study was conducted on Indian students. small sample size and online mode of data collection.

The second hypothesis formulated stated that the Communicativeness enabled by the LMS will have a positive effect on the perceived ease of use of the LMS. The results obtained suggest an acceptance of this hypothesis. Based on the final model results as formulated by SmartPLS 3 and AMOS 26.0, the current hypothesis was confirmed at a significance level. The results indicated a strong significant relationship between the communicativeness enabled by the LMS and the perceived ease of use; path coefficient 0.442 (PLS-SEM) and 0.25 (CB-SEM).

Results of a longitudinal study by Cheng (2013) investigating the roles of interactivity factors (controllability, responsiveness, two-way communication and personalization) and user experience in e-learning acceptance revealed that the interactive factors indirectly affected the students' intention to use e-learning through the extrinsic motivators (perceived ease of use and perceived usefulness) and the intrinsic motivator (perceived enjoyment). The studies' findings highlight that the advantage of an e-learning tool is based on interaction or communication (Damnjanovic et al., 2015; Jeschke & Vieritz, 2007; Mcardle & Bertolotto, 2010) are in line with the results of the present investigation.

The third hypothesis posited that perceived ease of use positively affects the perceived usefulness of the LMS. The results of PLS-SEM and CB-SEM indicated a strong significant effect of PEOU on PU; path coefficient .70 (PLS-SEM) and .79 (CB-SEM). This finding underlines that if students have a positive perception regarding the ease of use of the LMS, they will have a positive perception of its usefulness. Thus, the third hypothesis has been accepted.

In a study by Joo et al. (2016), data from a Korean online university was collected to study integrated relationships among their perceived ease of use, perceived usefulness, expectation-confirmation, satisfaction, continuance intention and actual usage of m-LMS. Findings revealed that perceived ease of use predicted perceived usefulness. According to the results of the study Šumak et al., (2011), PEOU has a strong and significant impact on PU of LMS. Another study investigating the factors influencing students' use of LMS within the context of Saudi Arabia revealed similar results regarding the relationship between principal TAM constructs (Binyamin et al., 2017). A longitudinal study was conducted to examine the roles of interactivity and usage experience in e-learning acceptance. The findings revealed a significant impact of PEOU and PU (Cheng, 2014). According to Igbaria (1993), Perceived Ease of use is a dominant factor in explaining perceived usefulness.

The fourth hypothesis stated that perceived ease of use (PEOU) positively affects attitude (A) towards using the LMS. The results of the present investigation reveal a significant and positive impact of PEOU on A; path coefficients .25 (PLS-SEM) and .27 (CB-SEM), thus resulting in the acceptance of the fourth hypothesis.

Šumak et al. (2011) investigated the factors affecting the acceptance and use of Moodle among students. The findings revealed a positive and significant effect of PEOU on A towards using Moodle. The significance of perceived ease of use and perceived usefulness in determining the students' attitude towards WebCT usage has been established by Ngai et al. (2007) in their study regarding user acceptance of WebCT. Similar results were reported by Binyamin et al. (2017) when investigating factors influencing the students' use of LMS at a Saudi Arabia university.

The fifth hypothesis stating a positive effect of PEOU on BI was rejected based on the investigation results. Although the results of the present investigation have support in the existing literature (Davis et al., 1989) which indicates that perceived ease of use is secondary and acts through perceived usefulness, the discrepancy in the results could be attributed to the factors such as small sample size, use of the self-report measure, Indian population, etc.

The sixth hypothesis postulated was that perceived usefulness (PU) positively affects attitude (A) towards using the LMS. Results of both PLS-SEM and CB- SEM structural model support the given hypothesis; path coefficient .69 (PLS-SEM) and .79 (CB-SEM).

The positive effect of PU on A was found in different studies (Lee et al., 2005; Liu et al., 2009; Ngai et al., 2007). The study by Juhary (2014) aimed to investigate students' perceptions regarding LMS usage at the Defense University of Malaysia. The study hypothesized that perceived usefulness would significantly impact attitudes toward using LMS, that perceived ease of use would significantly impact attitudes toward using LMS, and that students' attitudes toward using LMS would have a significant impact on users' behavioural intentions. The results of the investigation supported the proposed hypotheses.

The seventh hypothesis stated that perceived usefulness (PU) positively affects behavioural intentions (BI) to use LMS. As revealed by PLS-SEM (.33) and CB-SEM (.38), the path coefficients provide strong support for accepting the given hypothesis.

The study by Davis et al. (1989) reveals that Perceived usefulness predicts intentions to use. Liaw et al. (2007) through their study explored the instructors' and learners' attitude towards using e-learning. The results demonstrated that behavioural intention to use e-learning is influenced by perceived usefulness and self-efficacy. Gefen & Straub (2000) study indicates that perceived usefulness is a more critical factor than ease of use in determining system use. Studies

by Bhatt & Shiva (2020); Chatzoglou et al. (2009); Lee et al. (2005); Liu et al. (2009); C.-S. Ong & Lai (2006); Zhang et al. (2008) are in line with the results of the present investigation.

The eighth hypothesis stating a positive effect of attitude (A) towards LMS on the behavioural intentions to use LMS was accepted based on the results of PLS-SEM (.53) and CB-SEM (.45) structural model path coefficients. The findings from the existing literature (Lee et al., 2005; Liu et al., 2009; Ngai et al., 2007b) support the results of the current investigation.

CHAPTER 7: CONCLUSION, IMPLICATIONS, LIMITATIONS & SCOPE FOR FUTURE RESEARCH

7.1 Conclusion

The main findings of the study indicate that communicativeness (C) enabled by LMS has the strongest effect on the students' perceived ease of use (PEOU) (H1). The research model suggests that PEOU has the highest significant effect on PU towards LMS (H3), followed by the effect of PU on A (H6), then the effect of A on BI (H8) and lastly, the effect of PU on BI (H7).

However, there was no statistically significant evidence regarding the impact of communicativeness (C) on PU (H2) and the effect of PEOU on BI (H5).

7.2 Implications

The present study results have implications that are important to enhance the effectiveness and acceptance of LMS by the students.

As the results indicate, communicativeness enabled by LMS affects the students' perception regarding its ease of use of LMS; therefore, the LMS should possess features that enhance the communicativeness enabled by it effectively. Since the students' perception regarding the ease of use of LMS affects their perception regarding its usefulness, the LMS must provide all the necessary e-learning services that are deemed as rather easy to use and access, increasing the acceptance rate of the LMS. The software should also possess features that enhance its usefulness for the students.

7.3 Limitations

The present study had the following limitations:

1. The study was conducted on a small sample of the population (n=200); therefore, its results cannot be generalized to a larger population.
2. The data was collected through an online interface of Google forms, which could have affected the participants' response.
3. The study employs purposive sampling and rather than random sampling.
4. The results furnished are based on only one type of LMS, i.e. the LMS developed by TIET, Patiala; thus, the generalization of the results is limited to the features provided by that particular LMS.

7.4 Scope for Future Research

Based on the results and the limitations of the present study, future researchers could further investigate other external variables that influence the students' and teachers' acceptance of LMS. The prospective studies could increase the sample size that would enhance the generalizability of the results. More emphasis can be placed on the role of type of communication, i.e. student-student and teacher-teacher, in determining LMS acceptance. Rather than relying solely on self-report measures, future studies can employ task-oriented research work to assess the acceptance of LMS. The difference in acceptance of different types of LMS can also be further investigated.

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APPENDICES

APPENDIX A: Consent Form

You are invited to participate in a web-based online survey on the usage of Learning Management System in E- Learning in India. This is a research project being conducted by Jahanavi Khatri, a student at Thapar Institute of Engineering and Technology. It should take approximately 5 to 7 minutes to complete this survey.

PARTICIPATION

Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty.

BENEFITS

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about one of the aspects of E- learning in India.

RISKS

There are no foreseeable risks involved in participating in this study.

CONFIDENTIALITY

Your survey answers will be sent to an excel sheet where data will be stored in a password protected electronic format. Google forms does not collect identifying information such as your name, e-mail address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study.

CONTACT

If you have questions at any time about the study or the procedures, you may contact my research supervisor, Professor Santha Kumari via e-mail at santha@thapar.edu.

ELECTRONIC CONSENT:

Please select your choice below. You may print a copy of this consent form for your records.

Clicking on the “Agree” button indicates that

You have read the above information

You voluntarily agree to participate

You are 18 years of age or older

Appendix B: LMS acceptance Scale

A) Perceived Ease of Use:

To what extent do you agree with the following statements?

1- Strongly Disagree; 2- Disagree; 3- Neither agree nor disagree; 4- Agree; 5- Strongly Agree

1. Logging in to LMS is easy
2. Submitting the assignments through LMS is easy for me
3. It is easy to access materials from LMS
4. Giving a quiz through LMS is easy for me
5. Tracking my academic progress is easy in LMS
6. Engaging in forum discussions on LMS is easy for me
7. Messaging through LMS is easy.
8. Adding events to the LMS calendar is easy for me.
9. The process of using LMS is clear and understandable
10. It is possible to use LMS without expert help.
11. Overall, I believe LMS is easy to use.

B) Perceived usefulness:

To what extent do you agree with the following statements?

1- Strongly Disagree; 2- Disagree; 3- Neither agree nor disagree; 4- Agree; 5- Strongly Agree

1. LMS helps me to learn more efficiently.
2. LMS improves my academic performance
3. LMS makes my learning more effective
4. LMS makes it easier to manage my coursework.

5. LMS makes it easier to communicate with the faculty.
6. LMS enables me to accomplish my task more quickly
7. LMS makes it easier to learn at university.
8. LMS gives me more control over my learning.
9. Overall, LMS is advantageous for my learning

C) Communicativeness

How often do you use the LMS for the following?

1.Never; 2.Rarely; 3. Sometimes; 4.Oftern; 5. Always

1. -lectures/ slides
2. -Assignments
3. -Chats
4. -Wikis
5. -Quizzes
6. -Feedbacks
7. -Forums
8. -News
9. -Questionnaires
10. -Surveys
11. -Blogs

D) Attitude towards the LMS

To what extent do you agree with the following statements?

1- Strongly Disagree; 2- Disagree; 3- Neither agree nor disagree; 4- Agree; 5- Strongly Agree

1. Learning on LMS is fun
2. Using LMS is a good idea
3. LMS is an attractive way to learn
4. LMS quiz/ exam are better than traditional quiz/exam.
5. Even if it isn't mandatory, I would still use LMS.
6. Overall, I like using LMS.

E) Behavioral intentions

To what extent do you agree with the following statements?

1- Strongly Disagree; 2- Disagree; 3- Neither agree nor disagree; 4- Agree; 5- Strongly Agree

1. I intend to use LMS even during regular classes/ post pandemic
2. I predict I would use LMS frequently in the future.
3. I plan to use LMS in the next semester.
4. I will strongly recommend others to use LMS.