THE ROLE OF QUALITY FACTORS ON LEARNING MANAGEMENT SYSTEMS ADOPTION FROM INSTRUCTORS' PERSPECTIVES

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ABSTRACT
learning management systems have been largely used in universities for teaching, student learning, curriculum, and staff development. However, just providing higher education institutions with a learning management system does not guarantee a success. Quality assurance of these systems has become a central concern for practitioners, researchers, and system providers. In this context, this empirical research investigates quality factors that can contribute to learning management system adoption. In addition, the study developed a research model based on TAM and information systems success model by integrating associated quality indicators inclusive of system quality, service quality, information quality, and instructor quality. Quantitative data using questionnaire gathered from 365 lecturers in Palestine universities were inspected to evaluate the influence of various constructs on lecturers' adoption of learning management systems using structural equation modeling analysis technique. The research findings show that information quality, system quality, service quality, and instructors' quality can contribute to e-learning management system adoption with regards to their beliefs. This Research contributes positively to the limited literature on assessing the quality predictors of learning management system adoption.

INTRODUCTION

In the past decade, a major transformation took place in the way computers have been utilized in educational applications. It has branched out as a direct effect of the increase in computer usage in the educational field. In this evolution, e-learning has been recognized as an optimal method for contemporary teaching tools using the latest technology (Ma et al., 2008). As a result of the huge growth in students and trainees numbers, the development of e-learning has become an essential tool in providing information to many students and trainees simultaneously (Yakubu & Dasuki, 2018). Following said advancements in information communication technology (ICT), most organizations struggled to keep up to innovate new methods in adapting to the new technology, as opposed to traditional methods which have been established for years (Odunaike et al., 2013). With regards to education, ICT has made extensive learning mediums and tools for supporting and solving problems in many countries (Abdullah & Toycan, 2017; Bhrommalee, 2011).

Many developments have been formed on the educational technologies by which universities worldwide are constantly struggling to provide quality education to learners and instructors. Higher education institutions (HEI) worldwide have progressively adopted e-learning management systems for curriculum and learners, training, and teaching development. Nevertheless, just providing higher education institutions with a learning management system (LMS) does not guarantee a success (Cheng, 2012; Wirawan et al., 2018). Quality education in Palestinian HEI is the main priority of top management and decision makers (Shaqour, 2014). Quality assurance of e-learning management systems in educational organizations have gradually become a central issue for practitioners, experts, researchers, and system providers (Wirawan et al., 2018). literature shows that several research studies have concentrated on numerous sorts of factors for identifying instructors' adoption of LMS such as social factors, individual factors and organizational factors with partial attention upon the quality antecedents of instructors' adoption of LMS, as it is a significant part for higher education institutions if they are to assess the system to handle learning and teaching difficulties. Consequently, there is a need for extra additional investigations to empirically test quality variables impacting the instructors' adoption of e-learning management systems to achieve improvement in learning outcomes. Therefore, the key objective of the research is to examine whether quality factors can affect instructors' intention to adopt the LMS.

Accordingly, the researchers developed a model to inspect quality antecedents for instructors' adoption of LMS in HEI in Palestine.

Literature Review
learning Management Systems (LMS)

Universities worldwide are investing largely in numerous LMSs to provide e-Learning services (Caputi & Garrido, 2015). Based on Laster (2010), LMS is a self-contained web page with embedded educational tools that allow users to establish academic content and involve learners in teaching and learning process. The goal of LMS usage is to manage users by monitoring their improvement and progress (Kim & Do, 2016). LMS offers means for the learners to produce and convey content, keep track of users' contribution and to measure users' performance online beyond the limitation of time and place. The purpose of adopting LMS isn't just to enhance education efficiency and productivity (Siang & Santoso, 2015), but also to offer a different method of teaching. The continuous pressure to cut costs, and the substantial massive efforts that are presented by HEI to raise enrollment rates by providing flexible agendas that suited diverse users' requirements, have correspondingly encouraged the necessity for HEI to adopt LMS (Al-alak & Alnawas, 2011). It is considered that LMS would permit students and instructors at universities to acquire their learning in parallel in pursuing their individual needs and keeping their own professions, with no need to attend classes and be exposed to fixed schedules (Borstorff & Lowe, 2007).

Because of the growth of internet bandwidth and the progress of information technology (IT), LMS become able of combining diverse sorts of media such as video, graphics, audio, and text. Real-time tools have been embedded into LMS such as online chat and assessment to allow online education (Waterhouse, 2005). As a result, LMS is becoming gradually integrated into part of HEI. Since LMS has a significant part in education enhancements, several HEI has implemented them. Various HEIs are now resorting to LMS as learning and teaching tools for enhancing authentic e-learning (Al-Gahtani, 2014).

Technology Acceptance Model (TAM)

Adopted from the theory of reasoned action, Davis (1989) developed TAM, which is specifically meant to clarify computer usage behavior. Technology acceptance model aims at providing justification of the causes of technology adoption in general as well as a foundation for tracing the impact of external variables on individual beliefs, attitude, and intentions. Based on Lee et al., (2004), while many research studies on the use of information technology adopt different research frameworks, TAM of all models is considered the utmost acknowledged and frequently adopted a model for predicting usage of information technology.

IS researchers used TAM for three main reasons. First, it has a robust basis in theory. Venkatesh and Davis (2000) mentioned that a considerable amount of empirical and theoretical studies has accomplished in favor of TAM. Then, it can be considered as a standard to build effective applications. Finally, for the past decade, a stream of research studies supported the strength of the model in various situations, populations and a broad variety of information technology applications. TAM points that perceived usefulness (PU) and perceived ease of use (PEOU) influence computer user's intention and actual computer usage behavior. According to Davis (1989), PU is defined as "the degree to which a person believes that using a particular system would enhance his/her job performance". Meanwhile, the PEOU refers to "the degree to which a person believes that using a particular system would be free from efforts". While the technology acceptance model effectively anticipates some features of IT adoption and usage, weaknesses still exist. TAM as a standalone model is inadequate to completely predict the association amongst IT and acceptable behavior of its users since the model only cover two main variables (PU and PEOU). TAM main concepts do not entirely imitate the exact effect of social, individual and system variables that may influence the adoption of LMS.

Information System Success Model (DeLone and McLean IS Success Model)

An extensive assessment of information system previous literature conducted by DeLone and McLean (1992) to develop a widely accepted and cited IS success model. This model contains six IS success dimensions namely, organizational dimension, individual dimension, user satisfaction, use, information and system quality. These categories of success are interconnected rather than independent. The model offers a structure for categorizing the plenty of IS success variables that have been discussed in the literature and it recommends fundamental interdependencies among the variables (McGill et al., 2003).

DeLone and McLean (2003) again introduced an updated model of IS success, the new model included six variables, including three technological quality factors (service quality, information quality, and system quality), intention to use/use, user satisfaction and benefits. In their model, "net benefit" is the benefit gained from the adoption of the specific e-learning system (Wang & Wang, 2009).

Research model

IS success model and the TAM model has a main contribution over the development of the proposed research model of this study. The proposed model covers four kinds of quality variables and dimensions namely, instructors quality (attitude toward the system), system quality, information quality, and service quality (see figure 1).
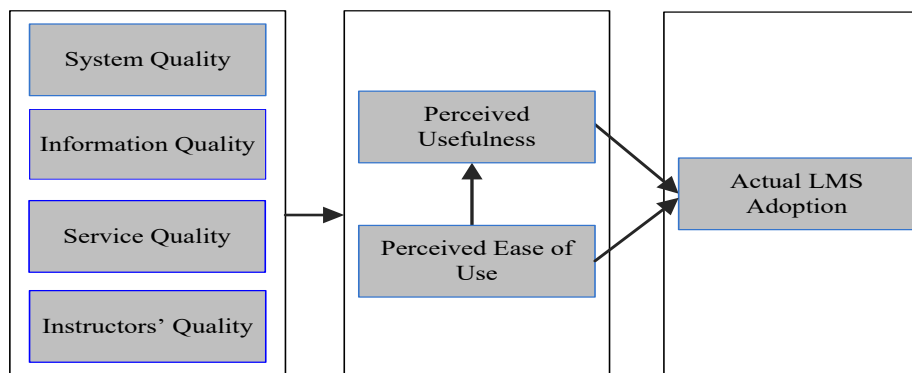

Figure 1. The basic proposed research model

VARIABLES IDENTIFICATION AND HYPOTHESES FORMULATION

Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Actual Adoption

PU is proposed to have a direct impact on actual system use because instructors become more enthusiastic to accept specific LMS if it is deemed beneficial. On the other hand, comprehensive literature over the past decades has given indications that PEOU directly or indirectly has an important influence on actual system adoption (Saadé & Bahli, 2005). The easier it is for an instructor to communicate with the LMS, the more probably he/she will notice it is helpful and accept it. Ong and Lai (2006) stated that PU influences individuals' interest in information system adoption due to the use value of system adoption on individual and organizations. In their study, Chang and Tung (2008) determined that when instructors find LMS as a useful tool, they were more likely to adopt it. At the same time, PU in terms of "better control over work, improve effectiveness, job efficiency, time-saving, educational performance" will impact their motivation and behavior to accept and use LMS.

On the other hand, Porter and Donthu (2006) hypothesized that when instructors perceive that LMS is difficult to use and there is a risk associated with learning new technology, they will reject the new system. Wang et al., (2003) and Amin (2009) reported that individual behavioral intention to perform a task is mainly influenced by PEOU. Ong and Lai (2006) found that PEOU had a substantial effect on users' intention to accept LMS. Accordingly, PEOU in the context of e-learning "less mental effort, less frustrating, flexible, less rigid, easy to understand, helpful guidance in performing tasks" may affect Palestinian instructors' willingness to accept LMS. In this context, the research model suggests that higher level of PEOU and PU of LMS will enhance an instructor's performance and acceptance. Hence, the next hypotheses are derived:

H1. "PEOU has a positive effect on the PU of LMS".
H2. "PEOU has a positive effect on the LMS adoption".
H3. "PU has a positive effect on the actual LMS adoption".

Attitude toward system

Davis et al., (1989) defined attitude toward system as "the degree to which the individual is interested in specific systems, which has a direct effect on the intention to use as well as actual use of those systems". Extensive

empirical researches approved that attitude toward systems is an important indicator of individual intention to adopt e-learning systems (Venkatesh et al., 2003a). Liaw (2008) added that no matter how advanced an information system is, its actual adoption relies on users having a positive attitude toward the system. Therefore, it is expected that users will have a greater intention to accept and adopt LMS once they have a positive attitude toward the system. In line with Sam et al., (2005), attitude toward system is one of the important variables affecting instructors' adoption of new. That is, in accepting a new information system, instructors' attitude seems to have the more vital part than their technical abilities. The diversity in users' behavior in accepting or not accepting LMS in higher educational institutions seems to be decided by the differences in their attitude toward those systems.

In general, instructors seem to have a moderately positive attitude toward LMS, but at the same time, they seem to have a moderately negative attitude on their own abilities in using such systems (Valentine, 2002). Badu-Nyarko (2006) mentioned that one of the reasons teachers in many universities prefer the traditional ways of teaching is because their attitude that obstructs change in their teaching methods. Based on Sharma and Chandel (2013), attitude toward system influence the acceptance of the e-learning systems through PU. Similarly, researchers like Al-Busaidi and Al-Shih (2010), Cheng (2012) and Adewole-Odeshi (2014) have mentioned that attitude toward the system has a strong relationship with PEOU, PU and system use. Based on this justification, it is hypothesized that:

H4. *"Attitude toward LMS has a positive effect on the PU of LMS".*
H5. *"Attitude toward LMS has a positive effect on the PEOU of LMS".*
H6. *"Attitude toward LMS has a positive effect on the actual adoption of LMS".*

System Quality

DeLone and McLean (1992) defined system quality as "the quality and functionality of an IS itself". It indicates the accessibility, responsiveness, reliability, flexibility, efficiency, and convenience of the information system (Kim et al., 2008). Eventually, good system quality will produce a convenient usage situation where individuals can professionally classify practical functions of the information system and efficiently navigate the resources that the information system delivers. System quality, in general, proved to have positive effects on the total adoption and acceptance of LMS (Kim et al., 2008; Thomas & Stratton, 2006; Wang & Wang, 2009). Igbaria et al., (1995) found in their research that system quality plays an important role as a determinant of LMS success adoption and indirectly influenced computer usage through PU and PEOU. Systems with better quality are expected to be accepted more than those of lower quality.

The main features and measures of system quality in the context of e-learning systems contain system functionality/accessibility, system interactivity, system response, and user-interface design (Cheng, 2012; Liu et al., 2010). System functionality defined as "the perceived ability of an e-learning system to provide flexible access to instructional and assessment media anytime and anywhere" (Pituch & Lee, 2006). Cho et al., (2009) highlighted that system functionality can certainly influence PU and PEOU. LMS permit instructors and users control over their teaching activities and it proposes more flexibility in learning with regards to place and time allowing therefore for better remote access to program content, instructors then recognize that the system is easier to use. System interactivity is one of the variables that influence instructors' acceptance of e-learning systems (Abbad, 2010). System interactivity refers to the "interactions between instructors and learners, and among instructors themselves, it also includes the collaboration in learning that results from these interactions" (Cheng, 2012). If instructors feel that the interactions among themselves and with learners via the learning management system are bi-directional, they consider the LMS is useful (Lee et al., 2009; Paechter et al., 2010). Essentially, instructors who perceive that LMS permits for more efficient interactions between instructors and learners also feel that LMS is an easy-to-use technology (Pituch & Lee, 2006).

System response is described as "the degree to which an instructor perceives that the response from the e-learning system is fast, consistent and reasonable" (Bailey & Pearson, 1983; Cheng, 2012). When instructors feel that there is a fast, consistent and reasonable response from the LMS, the system response will be perceived as useful among instructors (Pituch & Lee, 2006). Hypothetically, the LMS must be able to facilitate timely responses to users' queries. If instructors feel that the LMS can give them a timely and reasonable response, they will feel that the system is easier to use (Pituch & Lee, 2006). Furthermore, user-interface design refers to "the perception of the structural design of an interface that presents the features and instructional support of an IS" (Cho et al., 2009). The quality of user-interface design is central concern in determining the level of users' enjoyment, as well as their PU and PEOU (Cyr et al., 2006). The clearer the computerized instruction and good menu design with control toolbars will make instructors feel that such LMS is useful because of its user-friendly

functionality (Cheng, 2012; Cho et al., 2009). If the self-paced LMS screen design has a decent structure and its instructions are clear, instructors will navigate the contents and find information in an easy way and they feel that such LMS is easy to use a tool (Cho et al., 2009). This research concludes that LMS interface design largely influences acceptance and success of LMS. Therefore, the research hypotheses that:

H7. "System quality has a positive effect on the PU of LMS".
H8. "System quality has a positive effect on the PEOU of LMS".
H9. "System quality has a positive effect on instructors' actual adoption of LMS".

Information quality

Delon and McLean (1992) described information quality construct of LMS as "the degree to which the instructors' teaching performance is enhanced because of the use of the information acquired from or through such systems". Similarly, Wang and Wang (2009) defined is as "the quality of the output from a web-based learning system". It highlights the goodness of contents and forms that the LMS produces. Its measurement contains variables like consistency, scope, relevance, efficiency, currency, completeness, accuracy and timeliness of information and it includes also the course quality and course flexibility (DeLone & McLean, 1992; Tella, 2013). As reported by Ahn et al., (2007) and Chen (2010), information quality has significant positive impacts on the use and success of LMS.

Essentially, LMS tools have gained the attention of instructors because of the richness of contents delivered by the LMS via the internet (Lee, 2006). In comparison with traditional learning methods, relevant, accurate, updated, and rich course contents delivered by LMS may cause instructors to perceive that the system can be a valuable and beneficial way of teaching (Lee et al., 2009). when the online LMS content can be organized and combined with decent figures and apparent text, as a result, the content will be easy for instructors to accept the LMS instructions (Leflore, 2000). Besides, LMS that offers instructors the precise and reliable contents will make them perceive that using the system is easy and useful (Lee et al., 2009). Besides, if instructors consider the content given by the LMS as useful and meet their demands, this will make them confident in adopting the system (Choi et al., 2007). Based on Wang and Wang (2009) Information quality as an IS quality factor directly influence instructors' adoption of LMS and indirectly via PEOU and PU. Hence, the following hypotheses are proposed:

H10. "Information quality has a positive effect on instructors' PU of LMS".
H11. "Information quality has a positive effect on instructors' PEOU of LMS".
H12. "Information quality has a positive effect on instructors' actual adoption of LMS".

Service quality

Kim et al., (2008) defined service quality as "the overall support provided by the service provider, such as the ICT department, or a specific unit in an organization". It can also be outsourced services, and it refers also to the existence of different communication channels for timely helping instructors in solving LMS raising problems (Cheng, 2012). IS support services may include but not limited to help desks, hotlines and other online support services (Ngai et al., 2007). Much empirical research has also found that service quality provided by information services department staff is crucial to the acceptance of IS applications (Kim et al., 2008; Ngai et al., 2007; Wu et al., 2007). Roca et al., (2006) evaluated service quality by indicators associated with empathy, reliability, and responsiveness. However, this study considers the technical support as a main indicator of the service quality dimension. Lee (2010b) stated that the construct of service quality might be perceived as a crucial part in mapping instructors' behavioral attitude toward LMS adoption. Essentially, service quality will make instructors feel that LMS is an easy-to-use tool (Cho et al., 2009) when universities can provide them with adequate resources inclusive of trained service coordinators and skilled technicians (Lee, 2010a). Accordingly, sufficient and efficient technical support, good service quality, readiness of training tools has a direct influence on LMS PEOU and PU (Motaghian et al., 2013; Condie & Livingston, 2007; Franklin, 2007). So, the study proposed:

H13. "Service quality has a positive effect on the PU of LMS".
H14. "Service quality has a positive effect on the PEOU of LMS".
H15. "Service quality has a positive effect on instructors' adoption of LMS".

Methodology
Sample and Sampling Design

In this research, the sampling method used is stratified random sampling (Kalton, 1983). In stratified sampling, the population is divided into units or groups, called strata which should be as representative as possible for the population. Randomly selected individuals are taken from all the strata.

An acknowledged ratio of sample size in structural equation modeling is N: p = 5:1 (Kline, 2011). A ratio of five responses per parameter is required to obtain a trustworthy estimation. With a total of 34 elements, the effective sample size required to test the trustworthiness of the model would be 170. However, a sample of 370 was collected from the selected universities.

Survey Instrument

The self-administered survey questionnaire is developed to obtain the perceptions of university instructors in Palestinian HEI employing e-learning systems as part of their learning. According to Alreck and Settle (1995), the aim of the survey instrument is to translate the information needs of the researcher into a form that will extract data from respondents. To meet this objective, a questionnaire is developed as the research instrument.

Measures

In this study, responses to the items in service quality, system quality, information quality, instructor attitude towards e-learners, perceived usefulness (PU), perceived ease of use (PEOU), and system adoption was measured on a five-point Likert scale from 1 "strongly disagree") to 5 "strongly agree") with 3 labeled as neutral. Items chose for the constructs in this study were adapted and revised from previous research. The final items are listed in Table I along with their sources.

Table 1. Construct measurement and sources

Construct	Item	Questionnaire Items	Source
Perceived Usefulness	PU1 PU2 PU3 PU4 PU5 PU6	"Using LMS improves my teaching performance". "Using LMS improves my working efficiency". "LMS can help students enhance their learning effectiveness". "Using LMS saves time". "The use of LMS gives more teaching options". "Overall, I find LMS to be useful in my teaching activities".	Davis (1989).
Perceived ease of Use	PEOU1 PEOU2 PEOU3 PEOU4 PEOU5 PEOU6	"It is easy to integrate the functions of LMS with my teaching plan". "It is easy for me to become skilled at using LMS". "I find it easy to get LMS to do what I want it to do corresponding to the ways I teach". "It is easy to understand how to perform tasks using LMS". "It is easy to recover from error encountered while using LMS". "In general, LMS is easy to use".	Davis (1989).
Actual Adoption	AU1 AU2	"I will use LMS to perform teaching-related activities and to communicate with my students". "I will increase my use of the LMS in the future".	Ngai et al., (2007).
Attitude toward System	ATT1 ATT2 ATT3	"Using LMS for course instruction is a good idea". "Using LMS for course instruction is beneficial and convenient". "LMS provides an attractive learning environment".	Ngai et al, (2007) Shih (2008)
Information Quality	IQ1 IQ2 IQ3 IQ4 IQ5	"LMS can provide me accurate information". "LMS can provide me with sufficient information to do my tasks". "LMS can provide the precise information I need". "I am satisfied with the accuracy of LMS". "LMS can provide updated information regarding my tasks".	Rai et al., (2002) Negash et al., (2003).
Service Quality	SEQ1 SEQ2 SEQ3	"Training on the operation of LMS is sufficient". "Employees of the information service department have sufficient professional knowledge". "I can communicate with the technicians through multiple channels when I encounter technical problems and require quick responses".	Ngai et al., (2007)

	SEQ4	"Employees of the information service department can quickly fix my technical problems".	
	SEQ5	"The training provided can enhance my ability to use LMS".	
	SEQ6	"In general, the university provides enough support to help using LMS".	
System Quality	SQ1	"LMS has a well-designed user interface".	Pituch & Lee (2006)
	SQ2	"LMS allows me to control over my teaching activities".	
	SQ3	"LMS offers flexibility as to time and place of use".	
	SQ4	"LMS provides functions I need to do my teaching activities".	Cho et al., (2009)
	SQ5	"LMS language and means of communication are effective".	
	SQ6	"I can easily access LMS anytime I need to use it".	

Data analysis

The data analysis for this study is divided into two stages. In the first stage, preliminary data analysis was performed with the help of SPSS version, 23. Findings generated at this stage of analysis provided the general picture of the respondent's demographic statistics and their response to the survey instrument. In the second stage, the evolution of structured model using SEM technique was employed with the help of AMOS version 23.0. At this stage, interrelationships between multiple independent and dependent variables were examined to test the proposed hypothetical framework developed in chapter 3. In addition to this, both the measurement model and structural model analysis techniques were employed to identify the level of significance of various factors affecting the acceptance of LMS.

Results
Respondent Demographic Profile

The first part of the questionnaire sought the following demographic and background information of the respondents (gender, age, academic experience, academic rank, faculty, and department) (Table 2).

Table 2. Demography Statistics of Respondents

Variable	Item	Frequency (N= 370)	Percentage (%)
Gender	Male	276	74.4
	Female	94	25.4
Age Group	> 30	34	9.2
	30-40	135	36.5
	41-45	128	34.6
	<50	73	19.7
Teaching experience	> 5	75	20.3
	6-10	125	33.8
	11-15	88	23.8
	<16	82	22.2
Academic Rank	Master	132	35.7
	Assist. Prof	181	48.9
	Assoc. Prof	36	9.7
	Prof	11	3.3
	Others	10	2.7
University	Al-Quds University	70	18.9
	An-Najah University	73	19.7
	Bethlehem University	54	14.6
	Birzeit University	64	17.3
	Hebron University	57	15.4
	Palestine Polytechnic University	52	14.1

Results of the demographical characteristics of respondents demonstrated that the 74.6% of respondents were male while remaining 25.4% were female. This is almost close to the pattern of gender composition of faculty members in Palestinian universities. Based on Palestinian Ministry of HE, despite being most of higher education students, women are not well represented amongst the ranks of academic staff. Female faculty

employed on a full-time basis constitutes just fewer than 16 percent of the total in traditional universities and only 17 percent overall. All over the HEI, women make just 18 percent of full-time teaching staff and almost the same share of part-time staff. This result is almost like the findings of Al-Sayyed and Abdalhaq (2016) who found that male constitute 83% of lecturers in Palestinian universities.

A result for age and academic position indicates that almost half of the participants are assistant professors (48.9%). Two likely reasons for this distribution patterns are the promotion procedures, which often results in the delay of faculty members' promotion in most of the universities. It is likely that many faculty members were not satisfied with the promotion procedure in their universities. The other reason is the inability of some faculty members to meet the requirements of promotion, which could be associated with the first reason. Similarly, Al-Sayyed and Abdalhaq (2016) findings indicated that assistant professor lecturers constitute more than 40% which may suggest that bulk of academic staffers in state-owned universities are junior lecturers. Furthermore, the highest percentage of participants is coming from An-Najah National University. This result is expected; because An-Najah is the largest Palestinian University in term of the number of lecturers and students according to the Ministry of Education and Higher Education. However, regarding age distribution, results show that the average age of the respondents is around 40 years, which implies that faculty members are in their mid-age.

Structural Equation Modelling (SEM) Analysis

SEM is a statistical modeling technique designed to test conceptual or theoretical models. According to Hair et al., (2006), SEM helps researchers in examining the interrelationships among multiple variables (independent and dependent) simultaneously. Usually, SEM is performed in a two-step approach, i.e. the measurement model also known as CFA and the structural model also known as path analysis. Hair et al., (2006) believed that the measurement model (i.e. CFA) assist in testing the convergent-discriminant validity of the constructs. However, for the structural model (SM), Byrne (2001) indicate that it helps to identify the direct and indirect influence of one latent variable (LVs) in the model, i.e. SM tests the proposed hypothetical paths in the model.

Confirmatory Factor Analyses (CFA)

According to Hair et al., (2006), it is recommended to test the validity of the measurement model through two stages: (1) GOF indices and (2) composite reliability and validity. Based on these recommendations, the proposed research model was evaluated with the CFA, for the GOF indices, assessment of reliability and validity (convergent and discriminant) using AMOS version 23.0

To assess the overall GOF of a model, seven mostly commonly employed model fit measured were used, such as the ratio of X^2 to degrees-of-freedom (d.f.), the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), the norm fit index (NFI), Tucker-Lewis Index (TLI), the comparative fit index (CFI), and the adjusted goodness-of-fit index (AGFI). Fit model means the extent to which the proposed model is good and accounts for the relations among variables in the dataset. Recommended thresholds limits for all these GOF indices are mentioned in table 3.

As shown in table 3, GOF indices were categorized into three categories, i.e. absolute fit, incremental fit, and parsimonious fit indices. Although, results of initial CFA model lit indices (X2/df = 1.497, RMSEA = 0.037, NFI = 0.903, TLI = 0.927, CFI = 0.933, and AGFI = 0.802) found to be in acceptable limits. In addition to these GOF measures, the values of standard regression weights (factor loading) for all items found to be >0.7, and standard residual values found within the acceptable limit (above 2.58 or below -2.58). Consequently, based on all these satisfactory results, it was worth mentioning that the research model adequately fitted the data and no further re-specification and refinement was required.

Table3. Model fit indices for CFA

Measure indices	Fit indices	Results	Criteria	Reference
Absolute fit measure	X2			
	X2/Df	1.589	$1 < \chi2/df < 3$	Hair et al., (2006)
	RMSEA	0.037	<0.05	Bagozzi and Yi, (1988)
Incremental fit measure	NFI	0.903	≥ 0.90	Bentler and Bonett (1980)
	TLI	0.927	≥ 0.90	
	CFI	0.933	≥ 0.90	Bagozzi and Yi (2006)
Parsimony fit measure	AGFI	0.802	≥ 0.80	Hair et al., (1980)

At the same time, the assessment of reliability was performed using Cronbach's α reliability coefficients. Whereas, the validity of constructs was examined using three approaches i.e. convergent validity, discriminant validity and composite validity (Peter, 1981). To measure the overall reliability and internal consistency of each construct in the model, the researcher employed Cronbach's α reliability coefficients. Results indicated that reliability values for all constructs found above the recommended limit i.e. > 0. These results indicated high internal consistency and strong reliability among all constructs of the measurement model (see Table 4).

Table 4. Reliability, Average Shared Variance (ASV) and Average Variance Indicators (AVE).

Constructs	Cronbach's Alpha	AVE	ASV
System Quality	0.913	0.632	0.031
PEOU	0.897	0.593	0.008
PU	0.925	0.672	0.107
Service Quality	0.852	0.573	0.084
Information Quality	0.876	0.588	0.022
System Adoption	0.852	0.661	0.031
Attitude toward System	0.865	0.681	0.007

Convergent validity, on the other hand, as indicators in measuring certain construct whether they share a high proportion of variance in common (Hair et al., 2006). In order to measure the convergent validity of each construct used in the proposed model, the researcher employed AVE and estimates of standardized factor loading (Hair et al., 2010).

The acceptable requirement for factor loadings is to be equivalent to or higher than 0.50 and 0.70 respectively, indicating that the items relate to their factor. On the other hand, discriminant validity is related to correlation among the factors. To be free from discriminant validity problems, all items should be loaded highly on one factor. It can be achieved when the square root of AVE is above the correlation with any other variable (Fornell & Larcker, 1981). Additionally, another evidence of good discriminant validity is when AVE is greater than the ASV (Hair et al., 2010), and the square root of AVE is above the construct's correlation with other constructs (Fornell & Larcker, 1981). The ASV and AVE indicators are presented in Table 4.

The values of AVE for all constructs ranged from 0.502 to 0.717, which exceed the minimum requirements of 0.50 is another evidence of good convergent validity. Cronbach's alpha coefficient was the reliability indicators used. Therefore, both reliabilities were achieved as the alpha score all are above 0.7 which suggests that all the constructs had a good internal consistency.

Table 5. Discriminant validity

	AT	IQ	AU	PEOU	PU	SEQ	SQ
AT	0.88						
IQ	0.02	0.81					
AU	0.02	0.17	0.87				
PEOU	0.14	0.2	0.11	0.81			
PU	0.14	0.2	0.2	0.43	0.85		
SEQ	0.09	0.24	0.1	0.44	0.43	0.74	
SQ	0.12	0.02	0.26	0.22	0.09	0.2	0.83

Regarding the discriminant validity, the square root of AVE was higher than the correlation of other constructs presented in Table 5. In addition, the values for AVE for all constructs were higher than the values of ASV.

Therefore, this two validity evidence (convergent and discriminant) support the validity of the measures. This result suggests that the model has a sufficient degree of reliability and validity, allowing the analysis to continue with the assessment of the structural model.

Structural Model and Hypotheses Testing

Results of fit indices of the structural model are presented in Table 6. The likelihood ratio chi-square ($\chi2 = 3618.809$; df = 2299; p = .000) was significant (p < .001); x2/df achieved an acceptable fit of 2.150 and found well within limits i.e. 1.0 < x2 / df < 3.0). Moreover, the results for TLI and CFI were 0.916 and 0.920 respectively and were above the recommended value of $\geq$ 0.90. Similarly, the results of AGFI (8.01) met the recommended criteria of $\geq$ 0.80. Finally, the value of RMSEA also found within the recommended criteria of < 0.5 and achieved an acceptable figure of 0.040.

This study's proposed structural model is found to be fit with the data as per the above table. Visually, the measurement model and structural model look similar but with little modification, the relationship between constructs now changes to one directional arrow representing dependence relationship. The fitness of the structural model needs to be analyzed through a similar process of achieving goodness of fit.

Table 6. Structural Model Fit Indices

Measure indices	Fit indices	Results	Criteria	Reference
Absolute fit measure	X2/Df	1.574	1< $\chi2$/df<3	Hair et al., (2006)
	RMSEA	0.040	*<0.05*	Bagozzi and Yi (1988)
Incremental fit measure	NFI	1.000	*$\geq$ 0.90*	Bentler and Bonett (1980)
	TLI	0.916	*$\geq$ 0.90*	
	CFI	0.920	*$\geq$ 0.90*	Bagozzi and Yi (2006)
Parsimony fit measure	AGFI	0.801	*$\geq$ 0.80*	Hair et al., (1980)

Another important part of the structural model assessment is coefficient parameter estimates. Research hypotheses were tested by analyzing the path significance of each relationship and parameter estimates were used to produce the estimated population covariance matrix for the structural model. To examine the hypotheses of this study, critical ratios, standardized estimates and p-value were used.

It was assumed that a relationship is statistically significant at the 0.05 levels when the critical ratio (CR or t-value) found higher than ± 1.96 (Hair et al., 2006). All the casual paths in the model were examined based on the path estimates and CR (t-value). Results presented in table 7 shows that out of fifteen hypothesized paths between the variables, eleven were found to be significant. Whereas, the values of four hypothesized indicated that t-value did not exceed the cut-off point (>± 1.96) and hence are statistically insignificant.

Table 7. Regression estimates for latent constructs and hypotheses results

			Estimate	C.R.	P	(β)	Supported
ATT	→	PEOU	0.048	-1.120	0.263	0.048	No
IQ	→	PEOU	0.295	2.345	0.019	0.295	Yes
SEQ	→	PEOU	0.191	4.541	***	0.191	Yes
SQ	→	PEOU	0.116	2.831	0.005	0.116	Yes
ATT	→	PU	0.049	1.106	0.269	0.049	No
IQ	→	PU	0.180	1.962	0.05	0.180	Yes
SEQ	→	PU	0.126	2.849	0.004	0.126	Yes
SQ	→	PU	0.036	0.843	0.399	0.036	No
PEOU	→	PU	0.127	1.977	0.05	0.127	Yes
PEOU	→	AU	0.155	1.964	0.038	0.155	Yes
PU	→	AU	0.135	2.358	0.042	0.235	Yes
ATT	→	AU	0.101	2.197	0.047	0.151	Yes

			Estimate	C.R.	P	(β)	Supported
SQ	→	AU	0.310	5.070	***	0.310	Yes
SEQ	→	AU	-0.074	-1.179	0.238	0.074	No
IQ	→	AU	0.151	2.545	0.011	0.151	Yes

Note: Estimate = regression weight; C.R = critical ratio, P = significance
value. *** Significant at 0.001 level (two tailed)

Results of statistical tests such as critical ratio and standardized regression weight provided significant statistical evidence for the support of these hypotheses. Figure 2 depicts the final structural model after deleting the unnecessary paths and hypotheses that were rejected previously.
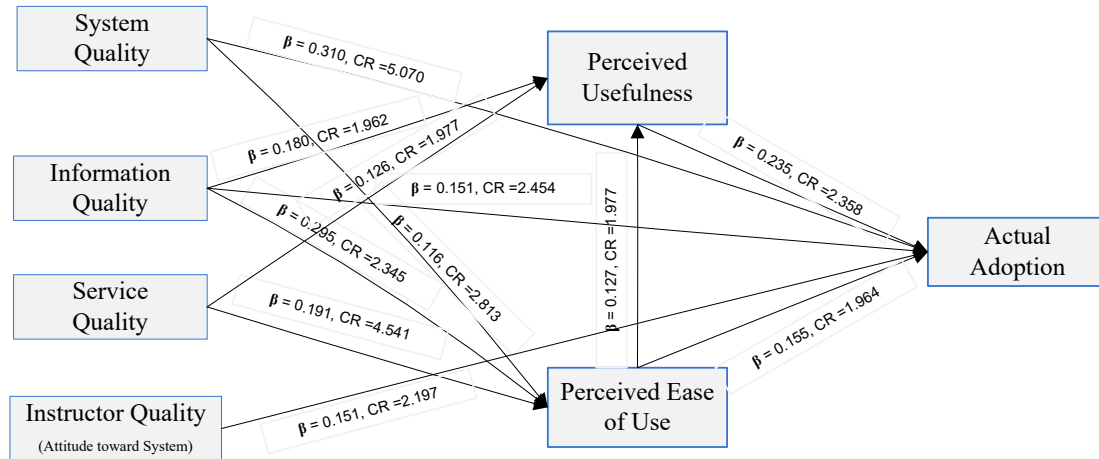
Figure 2. Structural model

Discussion

The research improves the understanding of influences of quality antecedents on instructors' adoption of LMS. The outcomes for each type of quality antecedents to instructors' beliefs are discussed. The hypothesized relationship between PEOU and AU was found to be significant. Therefore, based on the parameter estimate results (β = 0.155, t-value = 1.964, p = 0.001. This hypothesis was adopted from TAM, which implied that PEOU is a strong predictor of technology acceptance (Davis, 1989). Moreover, many researchers' empirical findings (Al-alak & Alnawas, 2011; Al-Gahtani, 2014; Al-Sayyed & Abdalhaq, 2016; Amin, 2009; Cheng, 2012; Findik & Ozkan, 2013; Hashim & Adviser-Eisner, 2011; Lee, et al., 2009; Maina & Nzuki, 2015; Mamat et al., 2015; Tarhini et al., 2015; Wang et al., 2003; Wichadee, 2015) found a strong impact of PEOU on actual LMS adoption and use. Researchers like Motaghian et al., (2013) also argued that the PEOU primarily influences the instructors' usage intention. Consistent with these previous studies, this research also found an empirical evidence of the fact that the acceptance and adoption of LMS are strongly influenced by its easiness perception.

Hypothesis H12 proposed that 'PEOU has a positive effect on the perceived usefulness to adopt LMS. As tested in the structural model, the parameter results (β = 0.127, t-value = 1.977, p = 0.001) suggested this hypothesis is supported by the results and hence can conclude to be statistically significant. Evident from these results is the fact that PU of LMS is significantly influenced by its ease of use belief that may further affect its adoption and acceptance to achieve the expected net benefit for higher education. This hypothesis was adopted from TAM, which posited that accepting to use information system is significantly influenced by its relative usefulness while considering its operational easiness (Davis, 1989). Similar to the findings of this research study, empirical findings of many previous research studies in similar context also found positive correlation between these constructs (Al-Gahtani, 2014; Al-Sayyed & Abdalhaq, 2016; Baleghi-Zadeh et al., 2014; Bousbahi & Alrazgan, 2015; Cheng, 2012; Davis, 1989; Fathema et al., 2015; Findik & Ozkan, 2013; Goh, 2011; Hashim & Adviser-Eisner, 2011; Lee et al., 2009; Tarhini et al., 2015; Wang & Wang, 2009; Yuen & Ma, 2008).

Therefore, it can be concluded that compared to the ease of use perception, the existence of positive belief on the usefulness would contribute towards the acceptance and adoption of LMS in Palestine HEIs to achieve the likely benefit. Overall, the role of both PEOU and PU is an important motivating determinant of LMS adoption. These findings further validated Davis's (1989) claim. In the context of LMS usage, Davis's claims can be restated as faculty members evaluate how easy or difficult it is to work with the LMS, and then they look at the usefulness of it for them. If they find it as an 'easy to use' and 'useful' technology for them then they develop a positive attitude towards it. The positive attitudes influence their actual use of LMS.

PU, on the other hand, is referred to as the user's perception of a specific innovation (system, service, technology) will improve his/her works performance (Davis, 1989). In this study, hypothesis H1b worded as "Perceived usefulness has a positive effect on the actual LMS adoption" was proposed. This hypothesis was found positive and statistically significant based on its parameter estimates (H1b: PU → AU; β = 0.235, t-value = 2.358, p = 0.001). Therefore, these empirical results supported the argument that usefulness beliefs of the potential users' have a positive influence on the instructors' intention to adopt and accept LMS. These results are consistent with the findings of original TAM which found that PU has a direct significant effect on the system use (Davis, 1989). Many empirical studies conducted in similar context of IS/IT acceptance and adoption (Al-alak & Alnawas, 2011; Al-Gahtani, 2014; Bousbahi & Alrazgan, 2015; Chang & Tung, 2008; Davis, 1989; Findik & Ozkan, 2013; Hashim & Adviser-Eisner, 2011; Kosgei, 2015b; Lee et al., 2009; Maina & Nzuki, 2015; Mamat et al., 2015; Motaghian et al., 2013; Qteishat et al., 2013; Saadé & Bahli, 2005; Tarhini et al., 2013a; Umrani-Khan & Iyer, 2009; Wang & Wang, 2009) which found similar results where PU had a significant impact on the system use. These empirical findings suggest that instructors are driven to accept and adopt LMS based on some believes established through the perception of its relative advantage after considering its usefulness. Therefore, it can be predicted that LMS is more likely to be accepted on large scale among instructors in various Palestinian universities if its usefulness is realized by the potential users. However, compared to PEOU (β = 0.155), the effect of PU (β = 0.235) is found to be stronger on AU.

Attitude toward system was supposed to have a direct and indirect significant positive effect on the LMS system adoption from instructor's perspectives in Palestinian higher institutions. The hypothesized relationship between attitude toward a system and PEOU and PU measured through hypothesis H9 and H9. The two hypotheses were statistically insignificant based on the parameter estimate results (β = 0.099, t-value = 1.106) and (β = 0.048, t-value = -0.120) simultaneously. Hence, these two hypotheses were rejected. These results indicated that attitude toward the system failed to find an indirect positive relationship with the instructors' actual use of LMS.

On the contrary, the hypothesis in this study was used to check the direct significance of instructors' attitude toward LMS on the actual LMS adoption. The results of parameter estimates (β = 0.151, t-value = 2.197) found to be statistically significant at p = 0.001. These findings indicated that the hypothesis found to be significantly accepted and implied that a positive attitude toward LMS from instructors would enhance their acceptance and adoption of LMS. Furthermore, these results are also in accordance with findings of many previous studies (Bhuasiri et al., 2012; Elkaseh et al., 2015a; Fathema et al., 2015; Ferdousi, 2009; Hashim & Adviser-Eisner, 2011; Nicholas-Omoregbe et al., 2017; Qteishat et al., 2013; Sharma & Chandel, 2013; Wichadee, 2015). It can be concluded that instructors concern and attitude toward LMS play an important role in determining the acceptance or rejection of the e-learning system.

System quality refers to the performance of the system itself in terms of accessibility, flexibility, integration, language, functionality, complexity, responsiveness and interfaces design to help instructors conduct teaching activities and facilitate learning. Results of parameter estimates of H11 (β = 0.036, t-value = 0.843) indicated that this hypothesis found to be statistically insignificant and hence, the hypothesis was rejected. The finding shows that system quality had no direct effect on PU was inconsistent with most prior studies (Andersson, 2006; Cheng, 2012; Hashim & Adviser-Eisner, 2011; Hayes, 2007; Lwoga, 2014b; Rogers & Finlayson, 2004). However, this finding was consistent with that of (Condie & Livingston, 2007; Motaghian et al., 2013; Wang & Wang, 2009). The effects of system quality may be useful during the initial implementation but will diminish over time. Therefore, it is important for the instructors to acquire and utilize useful information from web-based learning systems since perceived usefulness depends on the quality of the outputs of web-based learning systems rather than the system performance and its functions.

On the contrary, Parameter estimate results of H12 (β = 0.116, t-value = 2.813) suggested that this hypothesis was statistically significant at p = 0.001 level. System quality, which can be measured by factors including the design of user interface and the usefulness of the functions provided, may influence PEOU (Cheng, 2012; Condie & Livingston, 2007; Franklin, 2007; Hashim & Adviser-Eisner, 2011; Hayes, 2007; Rogers & Finlayson, 2004; Wang & Wang, 2009). However, the effects of system quality may decrease as the overall quality of IS improve because of new advances in methods and techniques of software and system development

(Wang & Wang, 2009). In the same way, hypothesis H11 worded as 'System quality has a positive effect on instructors' adoption of LMS' was proposed to have a direct significant relationship between system quality and actual LMS adoption. The results of parameter estimates (β = 0.310, t-value = 5.070) found to be statistically significant at p = 0.001 level.

Measures of information quality include personalization, completeness, easy to understand, security, timeliness, availability, relevance, and format of course contents delivered through the e-learning systems. Information quality was hypothesized to have both direct as well as indirect (mediated by PU and PEOU) positive effect on actual system use and adoption. The results of parameter estimates (β = 0.180, t-value = 1.962) for hypothesis H12a (IQ → PU) found to be statistically significant at p = 0.001 level and pointed out that information quality as part of system and technology factors is a strong predictor of PU to adopt LMS. This finding shows that if instructors perceive the e-learning system has accurate, updated, reliable, readable and well-formatted course contents, they will find the online courses more useful for their teaching processes. These results support previous research (Chen, 2010; Cheng, 2012). Therefore, information quality has a direct influence on instructor PU (Condie & Livingston, 2007; Hashim & Adviser-Eisner, 2011; Lwoga, 2014b; Motaghian et al., 2013; Rogers & Finlayson, 2004; Wang & Wang, 2009). Thomas and Stratton (2006) argued that an instructor's PU of web-based learning systems would increase if the information provided by web-based learning systems was beneficial to both students and instructors. Hypothesis H12b (IQ → PEOU) was worded as 'Information quality has a positive effect on instructors' PEOU of LMS. Results of parameter estimates (β = 0.295, t-value = 2.345) indicated that this hypothesis found to be statistically significant at p = 0.001 level. These results indicated that information quality can directly influence on instructor's PEOU. The more the web-based learning system output is relevant, timely, accurate and complete, the more the instructor finds the system easy for searching required information. This significant impact of information quality dictating ease of use to accept and adopt LMS substantiates previous findings (Cheng, 2012; Motaghian et al., 2013). Note that information quality contributed less to PU (β = 0.180) than PEOU (β = 0.295). At the same time, hypothesis H12c (IQ → AU) proposed that 'Information quality has a positive effect on instructors' actual adoption of LMS. Parameter result estimates (β = 0.151, t-value = 2.454) suggested that this hypothesis was statistically significant at p = 0.001 level and, hence, this hypothesis was accepted. Like the findings of Motaghian et al., (2013) where it was confirmed that the influence of information quality on increasing users' intention to use e-learning systems, the findings of this research study indicated that information quality also predicts instructors' intention to use web-based learning systems directly. Though information quality had a direct influence on instructors to adopt LMS, it has also a significant relationship indirectly through PU and PEOU that increased the actual adoption.

Service quality refers to the overall support provided by the service provider, such as the ICT department, specific unit in an organization or outsourced services (Ahn et al., 2007). Three hypotheses were proposed to investigate the effect of service quality on LMS adoption. The hypothesized relationship between service quality and PU measured through hypothesis H13a (SEQ → PU). Results of parameter estimates (β = 0.126, t-value = 2.849, p = 0.001) revealed that the path between these two constructs was found to be significant and hence, this hypothesis was accepted. These empirical results show that service quality is a strong predictor of PU. The results showed that the perception of online support service quality could be regarded as a key role in mapping users' behavioral intention towards LMS acceptance. It further showed that perceived service quality had a significantly positive impact on PU of e-learning systems. The finding that service quality, contrary to system quality, had a direct effect on PU was consistent with the findings of different studies (Ahn et al., 2007; Cheng, 2012; Lin, 2007b).

The hypothesized relationship between service quality and PEOU measured through hypothesis H13b (SEQ → PEOU) found to be significant and supported based on the parameter estimate results (β = 0.191, t-value = 4.541, p = 0.001). These results indicate that instructors perceive that an e-learning tool is an easy-to-use tool. It is realized when institutions can provide learners with sufficient service resources including trained service coordinators and skillful technical service engineers in online classes, the e-learning system will be perceived as easy to be used among instructors. The results of this study indicated that service quality increased instructors' PEOU of web-based learning systems. The empirically significant relationship between service quality and PEOU has also found by many earlier studies conducted in investigating the acceptance and adoption of new IS and LMS (Ahn et al., 2007; Cheng, 2012; Lin, 2007b; Motaghian et al., 2013; Wang & Wang, 2009).

Furthermore, according to hypothesis H13c (SEQ → AU), service quality was supposed to have a significant direct effect on actual LMS adoption and use. However, results of parameter estimates (β = -0.075, t-value = -1.179) indicated an insignificant relationship between service quality and actual system use. Therefore, this hypothesis was rejected. These findings suggested that service quality is not a direct fundamental determinant of LMS adoption. However, it indirectly influences instructors' attitude after considering its ease of use and usefulness. In contrast with results of Ramayah et al., (2010) research which confirmed the influence of service

quality on increasing users' intention to use e-learning systems, our findings indicated that service quality did not predict instructors' actual adoption of web-based learning systems directly.

Conclusions

The main objective of this study was to identify the quality significant factors that affect the adoption of LMS among instructors in Palestine HEIs. To achieve study objectives, a hypothesized research model based on TAM and IS success Model was developed. Various prior empirical research studies employing different well-known IS/IT theories/models were reviewed to identify their relevance to the contextual settings of the objectives of this research study. The primary data for this research is gathered using a survey questionnaire. This study employed a cross-sectional technique that is based on data that are collected at one point in time with a typical interest in describing relationships among variables for a stable population. A self-reporting, paper-based survey questionnaire was developed as the data collection tool. Instructors were asked to indicate their level of agreement or disagreement with various statements in the survey questionnaire with a 5 -point Likert- type scale as a measurement. Synthetically speaking, four types of quality Factors (system, information, service and instructors' quality), as the antecedents of e-learning acceptance can provide detailed accounts of the key forces underpinning learners' perception about their beliefs (i.e. PU, PEOU), and this situation can further lead to the enhancement of learners' usage intention of the e-learning system.

As with all other empirical research, this study has its limitations. First, the data collected was self-reported by instructors. Therefore, the reliability of the survey data is dependent on the instructors' honesty and completeness of their responses. It was difficult to know how accurately self-reports reflect their actual intention to use e-learning systems. Second, the findings of this study may not be generalized to the adoption of web-based learning systems of instructors in different contexts, such as elementary schools and high schools as it is targeted HEI only. Third, the proposed model was tested in Palestine's context and findings may vary in other underdeveloped countries. Additionally, the data for this research was collected under voluntary settings, which might not be the best condition for the respondents. Therefore, the findings may not be generalized to mandatory settings. However, the proposed adoption model is not a fixed and unchanged model and is open to continuous development. Future studies may extend or modify this adoption model by adding other dimensions or external variables that are valid for various educational level contexts. Also, this research was a cross-sectional study in gathering data from university students at a single point in time. It is recommended that future research conducts a longitudinal study to further understand the interrelationships between the various factors that may play a significant role in influencing student acceptance of LMS.

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