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The effect of convenience and self-efficacy on the satisfaction of learning management system usage

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ABSTRACT

Universities widely use the learning management system (LMS) technology due to its flexibility and ease of use for lecturers when managing online learning with the LMS. The primary determinant of success is the admittance of students utilizing this technology based on the LMS. However, institutions have challenges when utilizing LMS systems. The study aims to evaluate the factors that impact student satisfaction (SS) when using the LMS. The study methodology employs the Delone McLean model technique, incorporating the elements of convenience (Co) and self-efficacy (SE) into the survey. Data was gathered from a sample of 178 undergraduate students. The data analysis conducted using structural equation modeling (SEM) partial least squares (PLS) entailed the testing of six hypotheses. The results found that only three hypotheses were supported: information quality (IQ) and system quality (SQ) had a positive impact on SS. Student satisfaction also harmed the use of LMS (LU). This research contributes to the knowledge that internal and external factors of the LMS system also play an important role in the satisfaction of LMS usage.

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1. INTRODUCTION

A learning management system (LMS) defines an organization of online learning content by providing online access to students and lecturers. Increasing advancements in internet-based technology have increased the number of LMS users worldwide. Most universities worldwide already have LMSs to support the learning process [1], [2]. Examples of Asian Region countries that already use LMS at universities are Malaysia and Singapore. In Europe, among other countries, Germany has established LMS at all universities. The development of LMS technology is growing, and so many factors affect LMS users, including user satisfaction [3], [4]. In the context of education, students, student satisfaction (SS) is a very important indicator of online learning success using an LMS. With the availability of LMS technology that strongly supports the learning process, the student's academic achievement is also expected to increase [5], so the SS factor determines the continued use of the LMS.

The availability of learning resources that meet standards and the simplicity with which they can be accessed during activities will also directly impact the level of comfort felt in continuing to utilize the LMS. Additionally, a feeling of ease contributes to quick engagement and collaboration with lecturers and between students through the LMS. This ease can be achieved through the utilization of the LMS. According to several studies [6], [7], convenience (Co) is one of the most significant factors influencing LMS utilization.

Other factors, such as self-efficacy (SE), are the main component, where the sense of self-confidence to complete tasks improves performance. It has yet to be seen in previous studies, although user SE is very important. Using an LMS, users can facilitate work, especially for students following online learning, and interact online with other students and lecturers. Using LMS will ease the accessibility of learning anytime and anywhere, thus also affecting the Co of students using LMS. The user's comfort using the LMS is also important [8], [9]. This study aimed to determine the main characteristics that lead to students using LMS, as demonstrated by students from a state university in Malaysia, and Islamic university in Jakarta, Indonesia. Sampling from two campuses from two countries from the Southeast Asian region as representative examples of LMS implementation in developing countries. We employ the Delone McLean model framework (D&M model) to measure the effectiveness of LMS deployment, with SE and Co as individual impacts on LMS users at universities.

Previous studies have extensively investigated the variables that influence an individual's acceptance and use of technology. The Davis technology adoption model (TAM) and Venkatesh's unified technology acceptance and use of technology (UTAUT) are two examples of theories that explain the adoption of technology [10], [11]. The use and satisfaction of the information system (IS) dimension are commonly utilized in the D&M model theory due to its past application in research. The most popular TAM and UTAUT models were used in earlier studies on technology adoption, and several conceptual models were created [12]. Nevertheless, the UTAUT paradigm is limited to assessing user happiness and the system's function as a mediating variable in relation to person influence. Consequently, we are introducing a new variable. The Delone McLean model, importantly for this study, is both a TAM model and a UTAUT model. It proposed a process model influenced by six elements: system quality (SQ), information quality (IQ), service quality (SeQ), user satisfaction, sustainability the use of technology and its impact on individual users. In some Asian countries alone, the development of the D&M model has been extensive. Examples of cellular LMS use in Korea and a study of learning applications in Taiwan. The study of the use of LMS conducted by the state of Singapore showed that the quality of service and the system have a significant link to LMS use. For countries like Sri Lanka, it also shows that system, information, and SeQ significantly impact SS using LMS [13]. The purpose of this study is to determine the main factors that affect the utilization of university LMS from the perspective of students, using the Delone-Mclean model approach (D&M model), with specific emphasis on the aspects of Co and SE. The influence of students and their utilization of the LMS on the university. The researcher modified this study by adding Co and SE as a novelty from previous literature. These factors are relevant to the use of LMS. Modifications to the D&M model can be seen in the Figure 1.

Information quality is a character that looks abstract but has a great impact [14]. Previous study also showed that using e-learning based on LMS significantly diminished the quality of information [15]. Therefore, the quality of information is important, especially for students who use university LMS, to increase satisfaction. The hypothesis is proposed as: IQ has a significant positive impact on SS (H1).

System quality is a characteristic seen in the ease of use of technology [16]. Therefore, the SQ can affect user satisfaction with using LMS technology. Previous studies have shown that the system's quality affects user satisfaction and is also related to the impact on the organization [17]. In this study, we looked at students' perceptions of using university LMS by reviewing facility aspects and the usefulness of the LMS technology. We test the following hypothesis: SQ has a significant positive impact on SS (H2).

Service quality is the assistance provided to technology users by an IS service provider [18]. The success of using this technology system impacts the quality of services available. Hence, the role of the institution's system manager needs to be paid attention to [19]. Therefore, SeQ is an important factor that can affect SS. In this study, SeQ is closely related to using LMS systems. The hypothesis we give is as: SeQ has a significant positive impact on SS (H3).

On the use of university LMS, then in the study of factor Co according to the perspective of students influence on the satisfaction and loyalty of users, thus affecting the continued use, it is also perceived by the lecturer as a user of the University LMS [20], [21]. In this study, Co factors also help students to have flexibility in access and time and ease in learning [22]. It is very interesting for students. The hypothesis in the study is as: Co positively affects SS (H4).

According to the individual's assessment of their proficiency with computers and information technology, the initial definition of SE was established [23]. Computer SE was then included by researchers in the field of management information systems (MIS) as a crucial element in the development of MIS research. SE defined this as "the individual's perception of their ability to solve problems using computers" [24], [25]. In this study, the SE factor also determines how important the student's perception is related to the ability to use the university's LMS. From the results of this study, we tried the following hypothesis: SE positively impacts SS (H5). Variable representing a certain position SS is a variable that is influenced by other factors, but the researchers will directly examine it in relation to the use of LMS. Therefore, the following hypothesis: SS positively impacts LMS usage (H6). The research design is depicted in Figure 1.

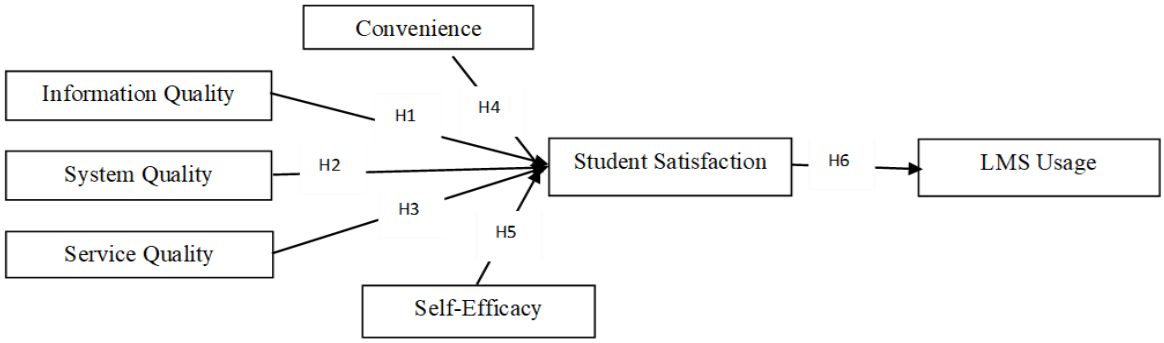

Figure 1. Student motivation model of online learning at home

2. METHOD

2.1. Participant and data collection

The target population of this study was first-year undergraduate students from an Islamic university in Indonesia and a state university in Malaysia. The sample data were 178 students, 73 males (41%) and 105 females (59%), who had used Moodle as their LMS. The study employs a quantitative methodology, including online questionnaires conducted via Google Forms. The form's URL is disseminated to students via a WhatsApp group only for students. This study employs cross-sectional methodologies. This study employs a questionnaire item to address the research issue, which is then broken into two components. The initial element comprises inquiries regarding the participants' demo profiles, encompassing their ages, genders, educational levels, duration of LMS usage (LU), and the primary gadget they utilize to access LMS. The second part of the questionnaire focuses on responses related to the key constructions of work research: IQ, SQ, SeQ, Co, SE, SS, and the use of LMS.

2.2. Measurement and data analysis

The study employed the technique of structural equation modeling (SEM) for data analysis. This study utilized the SmartPLS version 3.0 application [26]. Partial least squares (PLS) is a widely recognized technique used to assess the path coefficients of structural models. In recent years, marketing research has gained popularity because of its capability to analyze hidden patterns in tiny to medium-sized sample sizes, which was not possible before [27]. Therefore, SmartPLS is used to analyze study data. The research conducted using PLS has been found to be suitable as one component in this study. The PLS algorithm mechanism is also used to evaluate the set, weight, and path coefficients and determine the hypothesis's significance using the bootstrap method (5,000 samples) [28]. According to the experimental approval convention for the fundamental show reliance structure, the estimation demonstration is successful and accurate [29]. Finally, the blindfold approach was employed to establish and information collected and reasonable for preparing are along these lines tried utilizing SmartPLS 3.0. In this examination, a survey is utilized. The survey instrument is used to collect quantitative information regarding seven variables: IQ, SQ, SeQ, Co, SE, SS, and LMS usage. The instrument then divides the seven variables into 18 items using the Likert scale from 1 to 5. In this investigation, SmartPLS 3.0 software was used to test the research model using PLS structural equation modeling-variation-based (SEM-VB) analysis [30]. SEM is a statistical method in this investigation because it allows for simultaneous analysis and accurate predictions [31]. According to Table 1, the measurement constructs were shown.

3. RESULTS

3.1. Construct reliability, convergent, discriminant validity

In Table 2, confirmatory factor analysis (CFA), consisting of convergence and discriminatory validity measures, is used to examine construction validity. Convergence validity is the degree to which a set of constructive variables 'divide proportions' to produce a high variance or, in other words, convergence validity is the measure indicating that a set of indicators represents a single latent variable [32]. Discriminant validity refers to the extent to which a structure is significantly different from other structures, as demonstrated by a lack of strong connection across constructs [33], [34]. The researchers were unable to determine if the proposed structural route actually happened or was just the product of statistical differences because of the strong connection between the two structures. Table 2 presents the factor loadings, average variance extract (AVE), composite reliability (CR), and Cronbach alpha (CA) as metrics for assessing convergence validity.

The data indicates that 25 structures have outer loadings that surpass the suggested threshold of 0.60. Additionally, there is one additional loading with a value below 0.60, which is nevertheless considered acceptable since it satisfies the condition of having an AVE value larger than 0.5 [35], [36]. Consequently, the CR value above the minimal threshold of 0.60. These findings demonstrate that all markers of convergence validity have been satisfied, as the AVE and CR load factor values surpass the necessary criteria. Therefore, it can be inferred that all the items created are useful for generating latent variables.

Table 1. Measurement constructs

Construct	Item	Statement
IQ	IQ1	I can obtain accurate information from LMS.
	IQ2	The LMS can provide me with the necessary information to complete my duties.
	IQ3	LMS can provide updated task-related information.
	IQ4	The LMS can provide me with up-to-date task information.
SQ	SQ1	The LMS features an intuitive user interface.
	SQ2	The LMS provides time and location flexibility.
	SQ3	The LMS contains effective communication language.
	SQ4	LMS is readily accessible whenever I need to use it.
SeQ	SeQ1	Training on the LMS's operation is sufficient.
	SeQ2	Multiple channels are available to communicate with the technicians.
	SeQ3	The provided training can enhance my ability to utilize LMS.
	SeQ4	In general, the university provides sufficient support for LMS usage (LU).
Co	Co1	Using a LMS enables me to search for study-related information and content without time constraints.
	Co2	Using LMS facilitates my study and assignment tasks with less effort.
	Co3	Utilizing an LMS enables me to enhance learning outcomes.
	Co4	I can swiftly and easily access and utilize LMS.
SE	SE1	I am comfortable using a web browser.
	SE2	I am confident in completing tests online.
	SE3	I am comfortable uploading/downloading files.
SS	SS1	The LMS applications have met my expectations.
	SS2	The LMS application is of good quality.
	SS3	The LMS application meets my requirements.
LMS usage	LU1	Utilizing LMS is a wise decision.
	LU2	Working with the LMS is enjoyable.
	LU3	I enjoy working with LMS.

Table 2. Measurement model

Construct	Code	Loadings	CA	CR	AVE
Co	Co1	0.860	0.729	0.848	0.653
	Co2	0.877			
	Co4	0.671			
IQ	IQ1	0.811	0.861	0.905	0.705
	IQ2	0.824			
	IQ3	0.870			
	IQ4	0.852			
LMS usage	LU1	0.700	0.856	0.904	0.704
	LU2	0.902			
	LU3	0.882			
	LU4	0.856			
SE	SE1	1.000	1.000	1.000	1.000
SQ	SQ1	0.844	0.839	0.890	0.671
	SQ2	0.788			
	SQ3	0.857			
	SQ4	0.836			
SS	SS1	0.891	0.839	0.894	0.680
	SS2	0.870			
	SS3	0.836			
	SS4	0.686			
SeQ	SeQ1	0.765	0.852	0.900	0.691
	SeQ2	0.778			
	SeQ3	0.876			
	SeQ4	0.850			

The study utilized Fornell and Larcker's criteria from Table 3 to evaluate the discriminant validity. The AVE value is compared to the variation between a concept and other constructs based on the Fornell and Larcker criteria [37]. The primary characteristic of latent variables, diagonal AVE, denotes the most extreme value. According to research, there was sufficient discriminant validity if the square root of the connected construct's AVE was larger (>0.50) than any connection with other constructs [38].

Table 3. Discriminant validity

	Co	IQ	LMS usage	SE	SeQ	SS	SQ
Co	0.808						
IQ	0.659	0.840					
LMS usage	0.759	0.738	0.839				
SE	0.108	0.111	0.039	0.739			
SeQ	0.802	0.728	0.835	0.095	0.819		
SS	0.641	0.837	0.810	0.110	0.675	0.825	
SQ	0.643	0.669	0.847	0.105	0.687	0.893	0.832

Table 4 uses the determination coefficient (R square) to evaluate a structural model by measuring its predictive power. It is a square correlation between a specific endogenous structure's actual value and forecast. The coefficient represents the cumulative effect of the exogenic variable on the latent endogenous variable. Higher values indicate a more accurate prediction because the R square range is between 0 and 1 [26], [39]. Table 3 shows that the R-square value (LMS usage) is 0.655, and the R-square value (SS) is 0.909. The conclusion means that the LMS usage construct variable that the SS construct variable can explain is 65.5% with moderate results. In contrast, the rest is explained by other variables outside the study.

Table 4. R-square

	R square	R square adjusted
LMS usage	0.655	0.653
SS	0.909	0.907

3.2. Structural model evaluation

As presented in Table 5, the results of testing six hypotheses showed that three assumptions were accepted: for H1 on the confidence interval value at 5% of 0.423, for H2 on the confidence interval value at 5% of 0.561, and for H6 on the confidence interval value of 0.378. From these three accepted hypotheses, confidence interval values above the value of 0 are obtained; therefore, IQ and SQ significantly positively impact SS. Meanwhile, SS also has a significant positive impact on using LMS. Whereas in the other three hypotheses, H3 with confidence interval values at 5% (-0.247), H4 with confidentiality interval values at 5%, and H5 with confidence interval values at 5% (0.044), it appears that below the value of 0, we conclude that H3, H4, and H5 are rejected.

Table 5. Hypothesis testing

Hypothesis	Path	Std. Betta	Std. Error	t-value	Confidence interval			Decision
					Bias	5.0%	95.0%	
H1	Information quality->student satisfaction	0.498	0.050	9.871	0.003	0.423	0.592	Supported
H2	System quality->student satisfaction	0.646	0.048	13.430	-0.005	0.561	0.723	Supported
H3	Service quality->student satisfaction	-0.160	0.049	3.294	0.001	-0.247	-0.079	Rejected
H4	Convenience->student satisfaction	0.037	0.047	0.779	0.001	-0.042	0.109	Rejected
H5	Self-efficacy->student satisfaction	-0.001	0.023	0.025	0.002	-0.044	0.038	Rejected
H6	Student satisfaction->LMS usage	0.810	0.036	22.664	0.001	0.738	0.862	Supported

4. DISCUSSION

The reliability and validity test findings of the PLS-SEM-determined measurement model indicate that the model's formulation is both reliable and valid [40]. Meanwhile, the validation of the structural model shows that the model developed has strong conformity and extraordinary prediction accuracy [41]. The results of the developed structural model support hypotheses H1, H2, and H6, which posit direct effects. It suggests that the quality of information, SQ, and quality positively affect SS and that SS significantly affects LMS utilization [42]. It is pertinent to the findings of the research [43]. The result of the test of the first hypothesis is that aspects of the LMS system, such as IQ, significantly influence SS. It is because students feel the ease and reliability of the LMS [44]. This is also related to the testing of the second hypothesis, SQ on LMS, which also affects SS, but the opposite of the test of the hypothetical SeQ does not affect SS because it is still limited to the advantage of the feature side as the main component in the LMS [45]. Therefore, it needs to be raised again [46]. If we look at previous studies, we also found the inconsistency of the influence of the LMS factor system on the use of LMS and other external factors [47].

The fourth hypothesis is that Co does not affect SS due to factors of student condition that are not accustomed to using the LMS or environmental protection as a supporting factor of means or facilities different for each student. Students need to be fully aware of the LMS. In the fifth hypothesis test, SE indicates that it does not affect SS [48], this is due to the factor of student uncertainty in using LMS [49]. In the previous study, it was also shown that SE did not affect the satisfaction of students [50], [51]. However, in other studies, SE impacts SS [52]. Based on the established structural model, as many as three hypotheses were found to be significant, and three others were rejected. It also means that all the hypotheses formulated in this study are 50% supported. Therefore, the quality of information and SQ positively influence SS, and SS significantly positively impacts using LMS.

5. CONCLUSION

The study used Co and SE and tested these factors on SS, but the results did not show a significant influence. It is the result of the evaluation of the university's efforts to improve the LMS system so that it will improve SS and impact the university. In addition, the development of the Delone McLean model proves that the success of external factors also supports the process of successful use of LMS at the University. The results of this study also provide a solution for the sustainable use of LMS. However, this research is still very limited to the minimum number of respondents so that the results are still not optimal. Therefore, it is necessary to add the number of respondent samples in the next study. The final results of the research are also expected to be able to provide solutions for the use of LMS to be better than before.

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