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Evaluation of The Performance of Learning Management System Using IS Success Model

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Abstract—**Learning Management Systems (LMSs) have become a crucial element in digital learning at universities. However, not all LMSs demonstrate optimal implementation results. The urgency of this study arises from the need to ensure that the implemented LMS truly has a positive impact on the educational process, enhances the effectiveness of learning interactions, and increases user satisfaction. This study aimed to assess the effectiveness of LMS using the Information System Success Model (ISSM) proposed by Delone and McLean through a quantitative Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach. The variables analyzed included system quality, information quality, service quality, user satisfaction, system usage, and net benefits. The study's population comprised 548 LMS users from universities in Banten Province, including instructors and students who were active in the previous semester. Data were collected through questionnaire distributed via Google Form and analyzed descriptively and quantitatively using SmartPLS 3.0 software to test the outer and inner models. The results of the study revealed that of the 10 hypotheses tested, 6 were accepted and 4 were rejected. The main findings indicate that system quality and service quality have a positive impact on intention to use and user satisfaction. These findings provide practical contributions for LMS managers in formulating steps to improve system quality, as well as theoretical contributions in developing models to evaluate the success of information systems in education.**

Index Terms— **Evaluation of success, learning management system, Delone & McLean, PLS-SEM.**

I. INTRODUCTION

The digital transformation in the education sector have driven the adoption of various information technology-enabled systems, including LMS. Learning management systems have served as a key tool in supporting online and hybrid learning at universities, providing students and instructors with opportunities to access learning materials, organise assignments, and communicate academically efficiently. LMSs serve as key platforms that enable flexible, efficient, and integrated teaching and learning, particularly in higher education and distance learning. However, despite their growing use, the success rate of LMS implementation in educational institutions does not always yield optimal results, both in terms of efficiency of use and user satisfaction. An online learning platform is another term sometimes used to refer to [1].

The success of an information system, including an LMS, depends not only on technical factors such as features and appearance [2], but also on the quality of the information, supporting services, and users' perceptions of the benefits they experience and how they support the goals of educational institutions. In assessing the success of an LMS [3], a comprehensive and data-based theoretical framework is needed [4]. ISSM has become the primary guideline for assessing the success of information systems, with six main dimensions: system quality, information quality, service quality, system use, user satisfaction, and net benefits [5]. The model is highly relevant to measuring the effectiveness of an LMS because it combines technical aspects and user perceptions and has been widely adopted in information systems evaluation research, including in the education and e-learning domains.

Although several previous studies have applied the ISSM to LMS evaluation, the results are often specific and lack strong generalizability, particularly in the context of higher education in Indonesia. The model has received increasing attention from researchers as a tool for measuring information system success [6], making the evaluation of learning management system success crucial. Furthermore, many previous studies have relied on traditional statistical methods, even though complex models with latent variables require a more precise approach. Therefore, this study utilizes PLS-SEM as an analysis method, thanks to its ability to manage complex theoretical models with relatively small sample sizes and data that do not always follow a normal distribution. This method also supports the investigation of the direct and indirect influences between constructs that contribute to the success of an information system [7].

Given this situation, this study fills the gap by evaluating the effectiveness of LMS implementation in a rarely represented education sector: private higher education. This research provides an empirical analysis in an educational

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setting that has not been widely studied before, thereby adding to knowledge about the success of LMSs in a resource-constrained sector. These two studies investigate whether the relationships between elements in the IS success model exhibit different patterns in the context of educational institutions in Indonesia, thereby providing a theoretical contribution by expanding the model's generalizability. These three studies adapt the ISSM measurement tools to suit local user characteristics and technological conditions in Indonesia, which have not been widely explored in prior studies [5].

The purpose of this study was to measure the level of effectiveness of information systems implementation using ISSM in the context of the LMS, based on real data from students and lecturers who actively use it. Through this approach, this study can make theoretical contributions to validating ISSM and provide practical suggestions for LMS managers and policymakers in higher education institutions to improve the effectiveness of LMS implementation and the quality of digital learning systems.

II. Conceptual Framework

A. The DeLone and McLean's IS Success Model

The ISSM [5] integrates technical and non-technical elements that influence the utilization and effectiveness of information systems. This model identifies six key aspects that determine the success of an information system, namely:

- System quality: The level of ease of use, reliability, response time, and flexibility of the system.
- Information quality: The completeness, correctness, and applicability of the data generated.
- Service quality: The level of responsiveness, reliability, and assurance provided by the technical services.
- Use/intention to use: The frequency and manner in which users interact with the system.
- User satisfaction: The level of satisfaction users have with the system.
- Net benefits: The added value received by users or the organization.

User satisfaction and usage are affected by the relationship between information quality and system quality [8]. The impact of usage on user satisfaction can be either positive or negative. Both usage and user satisfaction affect individuals. ISSM presented an updated model in 2003 to accommodate changing management and user requirements in the age of e-commerce [9], as shown in Fig. 1.

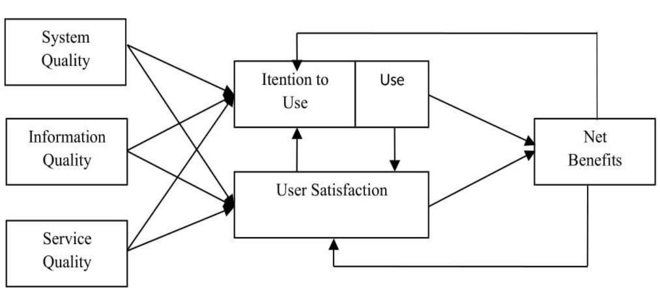

Fig. 1. ISSM [5].

This model is very comprehensive and has been widely used in LMS assessments in various situations [10]. ISSM assesses the processes and causal relationships among its dimensions. This model not only considers the six measures of information system success separately but also holistically, meaning that one measure influences the others.

B. E-Learning

E-learning is a combination of distance education and the use of information technology [11]. E-learning refers to an educational system or method that utilises communication and information technology in the learning process [12]. This term encompasses all forms of learning conducted through electronic devices, particularly the internet. An LMS is a system used for verification, registration, and access to learning activities [13]. Also, an LMS typically contains a list of available materials and a way for students to access them. An LMS serves as a software platform helpful in managing, recording, monitoring, reporting, automating, and delivering educational programs or training [14]. Common examples include Moodle, Google Classroom, Canvas, and Blackboard. This system needs to ensure participant participation in each material, including the ability to add or remove materials from the list.

E-learning and LMS complement each other. The concept of e-learning describes the learning process that takes place in a digital environment [15], while an LMS serves as the foundation that supports it [16]. Understanding these two elements is crucial for designing an efficient and sustainable digital learning system.

C. Partial Least Squares-Structural Equation Modelling (PLS-SEM)

PLS-SEM is a variance-based method in structural equation modelling (SEM) used to analyze complex relationship between latent variables and their indicators [17]. SEM is a modelling technique that allows researchers to simultaneously evaluate a set of interrelated variables [18], namely the relationship between several models linked by various variables. In research, this method is applied in multiple fields, including strategic management, marketing, and psychology [19]. The power of SEM lies in its ability to measure the extent of direct, indirect, and latent impacts in data analysis [20], test data validity and reliability, and facilitate data analysis through Smart PLS. There are two types of SEM: Variance-based SEM (PLS-SEM) and covariance-based SEM (CB SEM) [9].

PLS-SEM is used to analyze complex conceptual models involving multiple constructs and indicators [21]. This approach is efficient in managing small to medium-sized datasets, exploring models, evaluating the validity and consistency of constructs, and estimating causal relationships between latent variables. According to [22], PLS-SEM is a good fit for studies that aim to advance theory and understand the relationships among predictive variables [23]. In the context of LMS, this approach can simultaneously test the effects of system quality on user satisfaction and perceived usefulness [24]. The data analysis and validity methods in PLS-SEM comprise two models: the structural model, also referred to as the inner model, and the measurement model, or

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outer model [25].

Some key related studies are as follows: Study [26] developed an LMS assessment framework based on the ISSM and tested it using PLS-SEM, revealing a substantial correlation between LMS quality and benefits. Research conducted by [27] on the implementation of e-learning in Taiwan indicated that user satisfaction serves as an important mediator in achieving benefits from LMS. Meanwhile, [28] adopted ISSM for e-learning and highlighted the importance of a continuous evaluation process.

Some well-known contexts in which assessment has been discussed in the literature include pre-implementation evaluation, formative assessment, and post-implementation assessment [29], [30]. However, in practice, information systems assessment is often a neglected element in technology management, including in university settings. Over the years, the information systems assessment literature has shown that researchers have developed new instruments or adapted existing ones for different dependent variables, including net benefits [5] [31]. However, what is crucial is ensuring that the evaluation method is tailored to the specific conditions under which the information system operates [32], [33].

III. Research Methods

This study uses quantitative techniques within the explanatory research category. This method is used to describe the causal relationships between variables within the DeLone & McLean framework, which is applied to assess the success of a LMS. As seen in Fig. 2, this research method provides an in-depth understanding of the critical factors influencing the success of learning management system evaluation efforts.

The first step was to observe the LMS implementation in higher education institutions. Initial observations revealed problems, including low LMS use by students and instructors, dissatisfaction with existing features, and suboptimal technical support. These issues indicate the need for a comprehensive analysis of effectiveness from a user perspective. Literature research was conducted to explore theories and findings from previous studies on information system evaluation, with reference to ISSM developed by DeLone and McLean [5].

The study population consisted of LMS users, including students and lecturers who were involved in the last semester, totaling 548 individuals at universities in Banten province. The techniques for determining sample size applied the probability sampling approach, better known as random sampling. Probability sampling is a method for selecting samples at random, in which each element in the population has an equal chance of being selected [34]. With a 5% error tolerance and a 95% confidence level, the required sample size, based on the Slovin formula, is 230 participants.

A Google Forms-created questionnaire was used to gather data. Measurements were conducted using a 1–5 Likert scale, from " strongly disagree to agree strongly. The ISSM indicators for each construct guided the questionnaire's structure and were distributed directly to students and lecturers at universities in Banten Province.

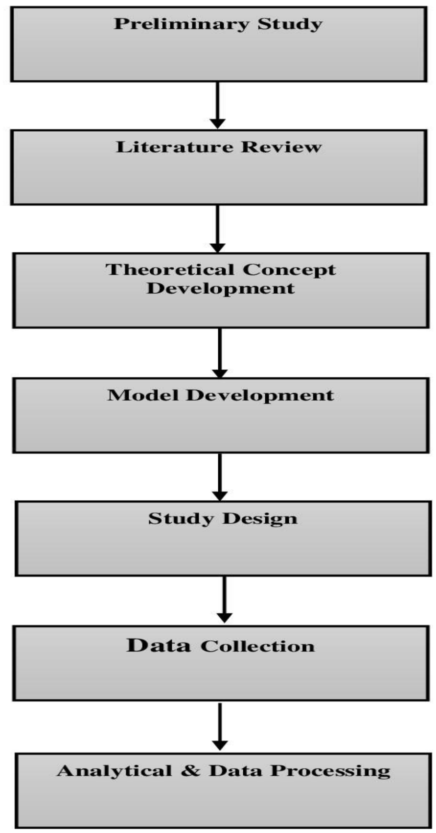

Fig. 2. Research procedure.

SmartPLS 3.0 was used to analyze the study data. The measurement model, also called the outer model, and the structural model, also known as the inner model, are the two submodels of PLS-SEM. The measurement model explains how the latent variables are reflected in the manifest variables. The structural model, meanwhile, estimates the strength of the relationship between each variable [35]. The study framework uses the IS Research work structure. This framework provides an overview of the research being conducted and explains the stages involved. The IS research framework used in this study is shown in Fig. 3.

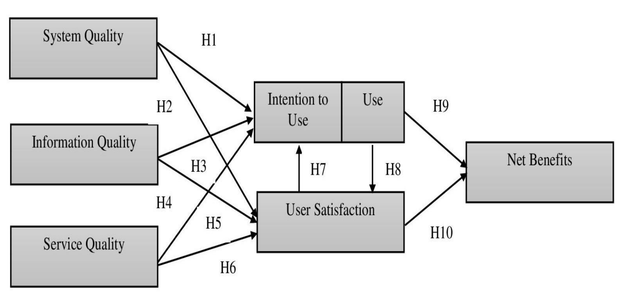

Fig. 3. Conceptual model based on ISSM.

The conceptual framework consists of the relationships between the nine research hypotheses:

- H1: System quality has a positive impact on intention to use.
- H2: System quality has a positive impact on user satisfaction.
- H3: Information quality has a positive impact on intention to use.
- H4: Information quality has a positive impact on user satisfaction
- H5: Service quality has a positive impact on intention to use.
- H6: Service quality has a positive impact on user satisfaction.
- H7: User satisfaction has a positive impact on intention to use.
- H8: Use has a positive impact on user satisfaction.
- H9: Use has a positive impact on net benefits.
- H10: User s satisfaction has a positive impact on net benefits.

Table 1 shows the measurement items of the indicators used to test the proposed construct.

Table 1.
Variables in The Study

Variable	Code	Indicator
System quality	SQ1	Ease of use
	SQ2	Maintainability
	SQ3	Response time
	SQ4	Functionality
	SQ5	Safety
Information quality	IQ1	Accuracy
	IQ2	Timeliness
	IQ3	Completeness
	IQ4	Consistency
	IQ5	Relevance
Service quality	SV1	Responsiveness
	SV2	Flexibility
	SV3	Functionality
	SV4	Security
	SV5	Extension
Intention to use	IU1	Perceived usefulness
	IU2	Extrinsic motivation
	IU3	Job-fit
	IU4	Relative advantage
	IU5	Outcome expectations
Use	U1	The frequency of use
	U2	The intensity of use
	U3	The extent of use
	U4	Thoroughness of use
	U5	Appropriate use
User satisfaction	US1	Efficiency
	US2	Affectivity
	US3	Flexibility
	US4	Adequately
	US5	Overall satisfaction
Net benefit	NB1	Continuity of usability
	NB2	Continuance of Services Provided
	NB3	Continuation of Usage
	NB4	System Continuation
	NB5	Promotion of Service

IV. Results

A. *Measurement Model Testing (Outer Model)*

- Convergent validity test

The convergent validity value indicates the extent to which the indicators in the measurement are valid. The recommended value for convergent validity is 0.70 [36]. Several indicators did not meet the outer loading standard (>0.70). Variable indicators that failed to meet the outer loading threshold must be removed to allow recalculation of the outer loading, thereby demonstrating that all existing indicators meet the established outer loading standard (>0.70), as shown in Table 2.

Table 2.
Outer Loadings Values for Each Indicator

Variable	Indicator	Outer Loadings
System quality (SQ)	SQ2	0.719
	SQ3	0.762
	SQ4	0.768
	SQ5	0.715
Information quality (IQ)	IQ1	0.771
	IQ2	0.860
	IQ3	0.857
	IQ4	0.852
	IQ5	0.835
Service quality	SV1	0.792
	SV2	0.718
	SV3	0.737
	SV4	0.803
	SV5	0.774
Intention to use	IU1	0.727
	IU2	0.798
	IU3	0.816
	IU4	0.831
	IU5	0.810
Use	U2	0.763
	U3	0.797
	U4	0.826
	U5	0.851
User satisfaction	US1	0.866
	US2	0.867
	US3	0.854
	US4	0.812
	US5	0.844
Net benefit	NB1	0.747
	NB2	0.716
	NB3	0.742
	NB4	0.840
	NB5	0.773

- Discriminant validity test

The value of the cross-loading factor to identify differences within a research construct, is known as the discriminant validity. The loading value of an indicator on a given construct must exceed the loading value on other constructs (cross-loading). Cross-loading of an indicator on another variable indicates that it has a stronger relationship with that variable than with the others. Based on Table 3, these results suggest that the indicator used to measure the variables have satisfactory discriminant validity.

Table 3.
Cross-Loading Values

	IQ	IU	NB	SV	SQ	U	US
IQ1	0.771	0.544	0.470	0.562	0.581	0.448	0.465
IQ2	0.860	0.626	0.530	0.709	0.722	0.579	0.613
IQ3	0.857	0.543	0.490	0.611	0.650	0.578	0.565
IQ4	0.852	0.541	0.453	0.587	0.603	0.517	0.518

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IQ5	0.835	0.591	0.550	0.677	0.555	0.634	0.597
IU1	0.446	0.727	0.378	0.599	0.466	0.534	0.548
IU2	0.533	0.798	0.505	0.554	0.532	0.494	0.521
IU3	0.624	0.816	0.492	0.618	0.588	0.590	0.577
IU4	0.519	0.831	0.543	0.605	0.537	0.648	0.617
IU5	0.591	0.810	0.577	0.629	0.564	0.668	0.641
NB1	0.516	0.531	0.747	0.502	0.457	0.532	0.486
NB2	0.390	0.437	0.716	0.358	0.379	0.451	0,391
NB3	0.386	0.385	0.742	0.332	0.405	0.431	0.378
NB4	0.519	0.534	0.840	0.496	0.443	0.552	0.526
NB5	0.456	0.496	0.773	0.423	0.421	0.520	0.465
SQ1	0.387	0.371	0.408	0.414	0.626	0.281	0.302
SQ2	0.489	0.425	0.369	0.500	0.719	0.324	0.371
SQ3	0.633	0.606	0.470	0.595	0.762	0.532	0.539
SQ4	0.599	0.491	0.423	0.541	0.768	0.514	0.575
SQ5	0.524	0.493	0.315	0.543	0.715	0.370	0.448
SV1	0.699	0.657	0.465	0.792	0.608	0.574	0.594
SV2	0.496	0.491	0.391	0.718	0.429	0.535	0.487
SV3	0.557	0.522	0.405	0.737	0.578	0.482	0.426
SV4	0.631	0.609	0.522	0.803	0.611	0.556	0.478
SV5	0.492	0.589	0.351	0.774	0.549	0.543	0.503
U1	0.300	0.483	0.521	0.440	0.350	0.633	0.382
U2	0.457	0.525	0.467	0.517	0.389	0.763	0.514
U3	0.485	0.585	0.519	0.527	0.418	0.797	0.602
U4	0.619	0.602	0.525	0.607	0.510	0.826	0.658
U5	0.663	0.664	0.523	0.628	0.564	0.851	0.695
US1	0.561	0.672	0.510	0.580	0.581	0.667	0.866
US2	0.583	0.647	0.570	0.589	0.589	0.659	0.867
US3	0.506	0.623	0.459	0.516	0.489	0.621	0.854
US4	0.554	0.578	0.440	0.517	0.463	0.551	0.812
US5	0.612	0.577	0.529	0.573	0.583	0.655	0.844

The discriminant validity test based on the Fornell-Larcker criteria [37] is presented in Table 4.

Table 4.
Fornell-Larcker Criterion Values

	IQ	IU	NB	SV	SQ	U	US
IQ	0.836						
IU	0.683	0.797					
NB	0.599	0.629	0.765				
SV	0.757	0.755	0.560	0.765			
SQ	0.746	0.676	0.552	0.729	0.720		
U	0.664	0.740	0.654	0.705	0.581	0.778	
US	0.664	0.731	0.593	0.655	0.640	0.745	0.849

- Reliability testing

Reliability testing is a step used to measure indicators in a study. An indicator is considered highly reliable if the composite reliability value exceeds 0.70. Furthermore, Cronbach's alpha is also used to assess reliability. The minimum expected value for Cronbach's Alpha is 0.70. The AVE standard must be 0.50 or higher, indicating that the average of a construct explains more than half of the variation in its indicators [38]. In the journal [39], a Cronbach's alpha value of 0.6-0.7 indicates an acceptable level of consistency. To assess reliability, the result is shown in Table 5.

Table 5.
Reliability Test

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Information quality	0.892	0.920	0.698
Intention to use	0.856	0.897	0.636
Net benefit	0.822	0.875	0.585
Service quality	0.823	0.876	0.586
System quality	0.770	0.842	0.518
Use	0.834	0.883	0.605
User satisfaction	0.903	0.928	0.720

B. Structural model testing (inner model)

- Coefficient of determination (R-square)

The R-Square coefficient of determination indicates the percentage of latent variables in a model and the extent to which exogenous variables explain endogenous variables. The R-Square evaluation criteria are divided into three categories: 0.67 is strong, 0.33 is moderate, and 0.19 is weak [38]. The findings of this study demonstrate clear strength, as shown in Table 6.

Table 6.
R-Square Determination Coefficient Value

	R Square	R Square Adjusted
Intention to use	0.677	0.671
Net benefit	0.454	0.449
User satisfaction	0.629	0.623

Overall, the three R-Square values indicate that the models used have strong predictive ability for Intention to Use and User Satisfaction, and are adequate for Net Benefit. This combination of findings provides empirical support for the DeLone & McLean model [5]. It confirms that the success of an LMS in an educational context is heavily influenced by system quality and perceived user satisfaction.

- Path coefficient

The statistical significance of the path coefficient between variables is determined by the T-statistic value in the latent variable relationship, which exceeds the T-table value and has a p-value of less than 0.05. A T-statistic of 1.96 and a P-value less than 0.05 (<0.05) are used with a significance level (a) of 5% or 0.05 to assess whether a hypothesis is acceptable and has a significant impact. Table 7 shows that of the 10 hypotheses analyzed, 6 were accepted, while 4 were rejected.

The combination of significant and insignificant paths suggests that the model has a strong structure. However, several variables still play a less substantial role in influencing LMS user perceptions or behaviour. These findings have important implications for system development, particularly by strengthening factors that have proven significant and reevaluating those that do not.

Table 7.
Path Coefficient Values

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
Information quality → intention to use	0.066	0.955	0.340
Information quality → user satisfaction	0.143	1.724	0.085
Service quality → intention to use	0.384	5.591	0.000
Service quality → user satisfaction	0.040	0.568	0.570
System quality → intention to use	0.114	1.829	0.068
System quality → user satisfaction	0.215	3.149	0.002

Use → net benefit	0.477	6.188	0.000
Use → user satisfaction	0.497	8.281	0.000
User satisfaction → intention to use	0.362	7.060	0.000
User satisfaction → net benefit	0.238	3.132	0.002

- Effect size testing (F-square)

The F-square value is used to evaluate the impact of exogenous constructs on the constructs. The F-Square values are shown in Table 8.

Table 8.
Effect Size Test Value

	IQ	IU	NB	SV	SQ	U	US
IQ		0.004					0.018
IU							
NB							
SV		0.159					0.001
SQ		0.015					0,048
U			0.185				0.309
US		0.197	0,046				

Based on the overall F-square value, the most influential factors in LMS success are Service Quality, Use, and User Satisfaction, with moderate values ranging from 0.15 to 0.35. These three are the main drivers of LMS success in the context of the DeLone & McLean model. The least influential factors are information quality < 0.02 (minimal) and system quality 0.02 – 0.15 (small). These results indicate that user experience, service support, and satisfaction are far more important determinants of LMS success than technical aspects and information quality.

1) Hypothesis testing results

To determine whether the hypothesis is accepted and has a noteworthy impact, this study found that six variables were accepted. The others were rejected when the P-values were less than 0.05, and the T-statistics were greater than 1.96. Based on these findings, this study was declared quite successful.

- Information quality has a positive impact on intention to use.

The relationship between information quality and intention to use have an original sample value of 0.066. This value indicates a positive correlation, but no significant effect, with a t-statistic of 0.955 < 1.96 and a P-value of 0.340, which is greater than 0.05. This fact means that although the information quality variable shows a positive correlation, it does not have a significant effect on intention to use, and is therefore declared Rejected [39], [40], [41].

- Information quality positively influences user satisfaction.

The relationship between information quality and user satisfaction showed an original sample value of 0.143. This value indicates a positive correlation, but it is not significant, with a P-value of 0.085 (greater than 0.05) and a t-statistic of 1.724 (less than 1.96). Thus, the information quality variable cannot have a significant influence on user ' satisfaction and is therefore ignored [42], [43], [44].

- Service quality has a positive impact on intention to use.

The correlation between service quality and intention to use is 0.384 in the original sample. This value indicates a positive relationship. Furthermore, the P-value of 0.000 is less than 0.05, and the t-statistic value of 5.591 are greater than 1.96. Therefore, this study concludes that the service quality variable has a significant effect on intention to use, and is consequently accepted [45], [46], [47].

- Service quality positively impacts user satisfaction.

The correlation between ' service quality ' and user satisfaction has a value of 0.040 in the original sample. This number indicates a positive correlation, but it is not significant, with a P-value of 0.570 (greater than 0.05) and a t-statistic of 0.568 (less than 1.96). These results indicate that the service quality variable do not contribute significantly to user satisfaction and are therefore rejected [48], [49], [50].

- System quality has a positive impact on intention to use.

The relationship between system quality and intention to use was 0.114 in the original sample. This value indicates that system quality has no impact on intention to use. Furthermore, the P-value of 0.068 is greater than 0.05, and the t-statistic of 1.829 is greater than 1.96. This fact suggests that the system quality variable is rejected, as it has no beneficial effect on intention to use and, therefore, is rejected [51], [52], [53].

- System quality positively impacts user satisfaction.

The relationship between system quality and user satisfaction shows a value of 0.215 in the original sample. This value indicates a positive. Relationship. Furthermore, the t-statistic of 3.149 is greater than 1.96, and the P-value of 0.002 is less than 0.05. Therefore, this study concludes that the system quality variable has a positive effect on intention to use, and is thus accepted [54], [55], [56].

- Use has a positive effect on net benefit.

The correlation between the use and net benefit variables is 0.477 in the original sample, indicating a positive relationship. Furthermore, the t-statistic obtained is 6.188, which is more than 1.96, and the P-value is less than 0.05, at 0.000. Therefore, this study concludes that the USE variables have a positive effect on net benefit, and is thus accepted [57], [58], [59].

- Use has a positive effect on user satisfaction.

The correlation between the USE variable and user satisfaction was 0.497 in the original sample, indicating a positive relationship. Furthermore, the t-statistic was 8.281, the P-value was 0.05, which is less than 0.05, and the value was greater than 1.96. Therefore, this study concluded that the USE variable has a positive impact on user satisfaction, and is consequently ‘Acceptable’ [60], [61], [62].

- User satisfaction positively influences intention to use.

The correlation between user satisfaction and intention to use is 0.362 in the original sample, indicating a positive relationship. The P-value is 0.000, which is less than 0.05, and the t-statistic value is 7.060, which is greater than 1.96. Therefore, this study concludes that user satisfaction positively influences intention to use and can thus be accepted [63], [64], [65].

- User satisfaction positively affects net benefits.

The correlation between user satisfaction and net benefits in the original sample was 0.238, indicating a positive correlation. Furthermore, the t-statistic was 3.132, which is greater than 1.96, and the P-value was 0.002, which is less than 0.05. Therefore, this study concludes that user satisfaction has a positive impact on net benefit, thus accepting this hypothesis [66], [67], [68].

C. Discussion

This study shows that four key relationships in ISSM are insignificant, namely information quality→intention to use, information quality→user satisfaction, service quality→user satisfaction, and system quality→intention to use. The rejection of these four hypotheses has significant theoretical and practical implications, especially in the context of LMS assessment applied in higher education environments.

1) *Implications of rejecting H1: Information quality→intention to use*

- Theoretical implications

The rejection of this relationship indicates that information quality does not function as a primary factor in influencing users' intention to continue using an LMS. The results of this study suggest that, in specific contexts, particularly in mandatory-use environments, DeLone & McLean's theory cannot fully explain the behaviour of using this system. In mandatory conditions, intention to use is not formed through an evaluation of the information provided, but rather driven by structural factors such as lecturer instruction, task demands, or curriculum requirements. Therefore, theoretical models need to include external variables such as performance expectancy (UTAUT) and perceived usefulness (TAM), which tend to play a more dominant role.

- Practical implications

LMS providers cannot rely solely on improving the quality of content or materials to increase user satisfaction. Factors such as academic needs, instructor delivery methods, and assessment mechanisms have a more significant influence. This fact means that pedagogical training for lecturers and the integration of the LMS into the curriculum are more strategically important than simply focusing on improving the accuracy or completeness of information.

2) *Implications of rejecting H2: Information quality→user satisfaction*

- Theoretical Implications

The rejection of this hypothesis indicates that user satisfaction is not determined by information quality assessment, although this aspect is a crucial component of ISSM. This situation suggests that LMS users are more sensitive to the interaction experience than to the quality of the content. This phenomenon supports studies showing that, in digital learning systems, factors related to understanding and interaction (such as navigation, speed, and evaluation features) have a greater impact on satisfaction than the information itself.

- Practical implications

Improving user satisfaction is not just about enhancing content or materials. LMS managers must focus on user experience elements such as interface design, level of interaction, accessibility, clarity of navigation, and the integration of interactive media. Therefore, information quality is not the most important aspect in improving user satisfaction.

3) *Implications of rejecting H4: Service quality → user satisfaction*

- Theoretical implications

The rejection of this relationship indicates that service aspects such as technical support, administrative speed, and operational assistance do not have a significant impact on user satisfaction. These findings can be explained by the low level of user reliance on support services within the LMS, which makes this element a less determining factor. This fact suggests that service quality is not a primary construct for users who are relatively independent and familiar with technology. Therefore, ISSM needs to be supplemented with other more appropriate variables, such as self-efficacy or digital literacy.

- Practical implications

System managers should not invest significant resources in technical service improvements to increase satisfaction. Instead, attention can be focused on improving system stability, optimising features, or enhancing usability. Support services can be prioritised lower than UX and system elements.

4) *Implications of rejecting H5: System quality→intention to use*

- Theoretical implications

The rejection of this hypothesis indicates that system quality factors such as reliability, speed, stability, and ease of use do not affect users' intention to use an LMS. This indication contradicts much research related to information systems, but is understandable in the context of mandatory use. Therefore, intention to use is shaped by external factors such as academic obligations, institutional control, perceived learning benefits, or motivation to learn. This phenomenon suggests that the ISSM cannot stand alone in explaining LMS usage behaviour and requires integration with other motivational theories or technology adoption theories, such as UTAUT.

- Practical implications

Improving the technical quality of an LMS does not automatically lead to more motivated users or increased engagement with the system. Institutional management must strengthen utilisation policies, support learning, and implement teaching methods that make the LMS a vital element in the learning process rather than just a supplementary system.

Overall, the rejection of these four hypotheses indicates that the mandatory context of use reduces the influence of the quality variables of ISSM on satisfaction and intention to use. LMS users are more influenced by external factors (such as policies, instructor guidance, and academic demands) than by system or information quality. The theoretical model needs to be expanded with variables from TAM, UTAUT, or motivational theory to provide a more comprehensive understanding. Practical implications highlight the importance of pedagogical, motivational, and institutional policy elements, rather than solely focusing on the technical development of the system.

V. CONCLUSION

This study was designed to assess the effectiveness of a

LMS using ISSM and analyzed using PLS-SEM. The analysis indicate that system quality, information quality, and service quality significantly influence user satisfaction and system utilization. Furthermore, user satisfaction and system utilisation are found to contribute positively to the net benefits of LMS implementation. The results of this study confirm the validity of ISSM in the context of digital learning systems in higher education. In other words, the success of an LMS is influenced not only by its technical quality and content, but also by users' perceptions of the benefits and convenience of using the system.

A limitation of this study is that the respondents came from only one educational institution. This condition means the results cannot be generalized, as each institution may have different user characteristics, learning cultures, and LMS implementations. To achieve these goals, future research is recommended to involve participants from multiple institutions and expand the sample size to reach more representative findings. Furthermore, a long-term approach should be adopted to monitor changes in LMS usage, enabling the designed evaluation model to be tested for robustness and further refined.

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