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AN EFFECTIVENESS OF LEARNING MANAGEMENT SYSTEMS IN HIGHER EDUCATION: THE DELONE AND MCLEAN-SEM APPROACH

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Abstract: Information Technology has impacted various sectors, including education. Learning Management Systems (LMS) are designed to facilitate lecturers and students in accessing academic activities such as online learning. This study aims to analyze the effectiveness of Learning Management Systems (LMS) among higher education institutions in Indonesia. This analysis is crucial for assessing the effectiveness of LMS use by universities in Indonesia, enabling investments in LMS to yield optimal results. The study employed the D&M IS Success Model and PLS-SEM to evaluate the relationships between various variables, including system, information, service quality, user satisfaction, and benefits. Simple random sampling was used to collect data from 170 universities in Indonesia. This study employed PLS-SEM to investigate the observed variables, including validity and reliability testing, which involves assessing reliability, convergent validity, and discriminant validity. This current study found that all the hypotheses were accepted with p-values below 0,05. These findings contribute to universities paying attention to aspects of system, information, and service quality in Learning Management Systems (LMS) to improve user satisfaction and create a positive perception of benefits. Therefore, this research yields significant results that contribute to higher education in Indonesia, as well as the advancement of knowledge in management information systems.

Keywords: delone and mclean; information system success; LMS; SEM-PLS.

Abstrak: Teknologi Informasi telah memengaruhi berbagai sektor, termasuk pendidikan. Learning Management System (LMS) dirancang untuk memfasilitasi dosen dan mahasiswa dalam mengakses kegiatan akademik seperti pembelajaran daring. Penelitian ini bertujuan untuk menganalisis efektivitas penggunaan Learning Management System (LMS) di perguruan tinggi di Indonesia. Analisis ini penting untuk menilai sejauh mana efektivitas penggunaan LMS oleh universitas-universitas di Indonesia, sehingga investasi dalam LMS dapat mem-berika n hasil yang optimal.Penelitian ini menggunakan model D&M IS Success Model dan metode PLS-SEM untuk mengevaluasi hubungan antara berbagai variabel, termasuk kuali-tas sistem, informasi, layanan, kepuasan pengguna, dan manfaat. Teknik simple random sampling digunakan untuk mengumpulkan data dari 170 perguruan tinggi di Indonesia. Penelitian ini menggunakan PLS-SEM untuk mengkaji variabel-variabel yang diamati, ter-masuk pengujian validitas dan reliabilitas, yang mencakup penilaian reliabilitas, validitas konvergen, dan validitas diskriminan. Hasil dari penelitian ini menunjukkan bahwa semua hipotesis diterima dengan nilai p di bawah 0,05. Temuan ini mendorong universitas untuk memberikan perhatian pada aspek kualitas sistem, informasi, dan layanan dalam penggunaan LMS guna meningkatkan kepuasan pengguna dan menciptakan persepsi posi-tif terhadap manfaatnya. Oleh karena itu, penelitian ini memberikan hasil yang signifikan bagi perguruan tinggi di Indonesia serta turut berkontribusi dalam pengembangan ilmu di bidang sistem informasi manajemen.

Kata kunci: delone and mclean; kesuksesan sistem informasi; LMS; SEM-PLS

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INTRODUCTION

The utilization of technology, particularly information technology, has been rapidly advancing in the modern era. Various sectors, including business, government, healthcare, and education, have adopted information systems. This development is expected to continue in the future. Information systems can assist individuals or organizations in decision-making. An application of information technology in the education sector is the Learning Management System (LMS). LMS is expected to facilitate lecturers and students in conducting academic activities more efficiently, whether in online or offline learning environments.

Academic activities supported by information systems are generally more efficient compared to conventional methods that still rely on paper-based processes. Information systems offer advantages in data integration, from data input to processing. Data recording becomes easier to manage and more secure when stored on servers. The research goal is to analyze the success of LMS by utilizing the Delone and McLean Information Systems Success Model (D&M IS Success Model) and Partial Least Squares Structural Equation Modeling (PLS-SEM).

A comprehensive analysis is necessary to assess the measurable benefits of LMS utilization in academic activities within higher education, ensuring that technology implementation is well-targeted. The ineffective implementation of information systems could lead to suboptimal IT investments. Evaluation of IS projects plays critical importance considering that modern organizations sustainable rely on success of IS projects [1]. The D&M IS Success Model utilizes several variables, such as information quality, system quality, service quality, and user satisfaction, as indicators for assessing the benefits of an information system [2], [3], [4].

System Quality refers to the characteristics that determine how effectively an information system functions, including ease of use, flexibility, reliability, and speed. Information Quality pertains to the characteristics of the system's output, such as managerial reports or interface displays on applications and websites. Therefore, high-quality information contributes to user satisfaction [5].

Service Quality represents the level of support provided to ensure the effective use of the information system. System Use assesses how frequently and extensively users utilize the information system, including usage intensity, purpose, and habits. User Satisfaction measures the degree of satisfaction users experience while using the information system. Net Benefits describe the overall contribution of the information system to individuals, organizations, businesses, industries, and the country's economy.

Previous studies have shown that information system implementations often encounter failures. Inadequate IS often induces workaround behavior, a phenomenon that is insufficiently understood in contemporary organiza tions [6]. Ineffective implementation of information systems can lead to unprofitable IT investments. Therefore, analyzing information systems is crucial to ensuring their success.

A study employing the PLS-SEM method at Hasanuddin University's LMS revealed that good system and infor mation quality play a crucial role in enhancing user satisfaction and the individual impact of the system [7]. This study complements previous research by validating the variables in the Delone and McLean model related to information

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system success, particularly in educational institutions that have recently implemented Learning Management Systems (LMS). Additionally, this study offers a new perspective on selecting suitable indicators to measure variables in assessing information system success, drawing on findings from previous research.

METHOD

The study on analyzing the success of LMS implementation in Indonesian higher education institutions using the D&M IS Success Model will be conducted through several stages, as illustrated in the following steps:

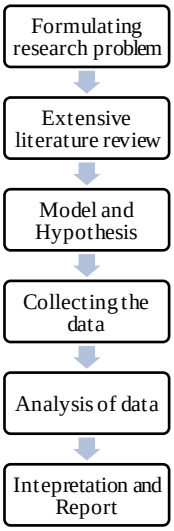

Image 1. Research Flow

The first step is to formulate the main research problem, which involves identifying the factors influencing LMS success in Indonesian higher education institutions using the D&M IS Success Model and PLS-SEM as the analysis technique. Then, conduct a literature review, referring to relevant books and previous studies.

The third step is to establish hypotheses and design a research model to determine the key success factors based on the D&M IS Success Model. Simple random sampling is used to collect data and distribute it through online questionnaires to respondents, specifically university rectors or vice-rectors. Analyzing the data using the PLS-SEM method with the Smart-PLS 4 application.

Research Model

The proposed model is using modified D&M IS Success Model by removing the intention to use/use variable since LMS is a mandatory system for lecturers and students. This modification aligns with the study by Kristy M [8], which stated that the use/intention to use variable is not relevant for systems that are compulsory. The following picture below is the proposed research model and hypotheses based on the D&M IS Success Model:

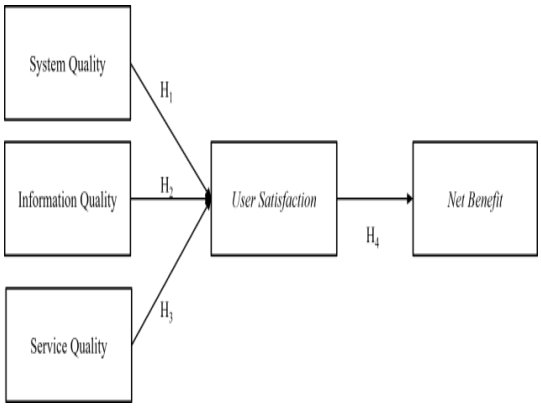

Image 2. Proposed Model

Proposed model could be elaborate as H1: Information Quality (IQ) positively affects User Satisfaction (US), H2: System Quality (SQ) positively affects User Satisfaction (US), H3: Service Quality (SQ) positively affects User Satisfaction (US), H4 User Satisfaction (US) positively affects Net Benefit (NB).

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Data Collection

The respondents in this study are representatives from higher education institutions in Indonesia, represented by the rector or vice rector. The respondents were asked to complete a questionnaire, which served as the instrument for data collection. The questionnaire was administered online using Google Forms. It consists of 19 indicators, divided into several questions. The measurement scale for variables in this study utilizes a Likert scale. The Likert scale is widely used in quantitative research for measuring opinions or perceptions in research contexts [9]. Each question is rated on a scale from one to five. Each variable has several indicators that serve as measurement tools for the variable.

The collected data was then analyzed using the PLS-SEM method. PLS-SEM is well-suited for the D&M IS Success Model, which consists of five latent variables with a high level of indicator complexity. The data obtained may not follow a normal distribution, which is common for Likert scale-based data. PLS-SEM is an appropriate choice because it does not require the assumption of multivariate normality. PLS-SEM can be applied to small sample sizes while still providing stable results as long as the required criteria are met. PLS-SEM can analyze data with both formative and reflective constructs.

Validity and Reliability

SEM is a method to assess the measurement model, which includes evaluating construct reliability, indicator reliability, convergent validity, and discriminant validity of the defined constructs. Construct reliability is determined by using composite reliability (CR) and Cronbach's alpha (CA). The criterion is that the CR value should be greater than 0.7 or 0.8 to indicate adequate construct reliability [10]. The result of measurement model results shown in the following Table 3. In table 3, it's shown that that the CR values obtained in this study are greater than 0.70, confirming sufficient construct reliability.

Next, indicator reliability is assessed through CA, where the CA value must be higher than 0.60. As a result, the CA values for all factors in this study are acceptable. Convergent validity of the constructs is determined using the average variance extracted (AVE), which must exceed 0.50 [11]. Since the results indicate that all constructs have substantial AVE values, the convergent validity of the constructs in this study has been verified.

Variance Inflation Factor

Discriminant validity of the constructs was further assessed using the HTMT approach, which relies on a multitrait-multimethod matrix. Table 1 displays the outcomes of both the Fornell-Larcker criterion and HTMT analysis, while the cross-loading values are reported separately. The value of HTMT should be lower than 0.85 or 0.9; if HTMT = 1, the hypothesis should be rejected [12]. In this study, the findings support the presence of discriminant validity, as each construct shows higher loading values compared to other constructs. Additionally, the Fornell-Larcker criterion analysis demonstrated strong inter-construct relationships, reinforcing the robustness of the measurement model.

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Table 1. Measurement Model Assessment

	SQ	IQ	SERVQ	US	NB
Fornell-Larcker Criterion					
SQ	0,900				
IQ	0,455	0,887			
SERVQ	0,592	0,732	0,922		
US	0,524	0,802	0,876	0,954	
NB	0,543	0,663	0,779	0,745	0,945
Heterotrait-Monotrait Ratio (HTMT)					
SQ	-				
IQ	0,563	-			
SERVQ	0,780	0,881	-		
US	0,511	0,867	0,843	-	
NB	0,626	0,832	0,871	0,77	-

Note: SQ: System Quality; IQ; Information Quality; SERVQ: Service quality; US: User satisfaction; NB: Net Benefit

RESULT AND DISCUSSION

Based on Table 2, the study respondents indicate that 77.1% of higher education institutions (HEIs) have implemented Learning Management Systems (LMS) to enhance institutional effectiveness. Additionally, 14.1% of higher education institutions (HEIs) in residential and rural areas have adopted Learning Management Systems (LMS), while 8.8% of HEIs in coastal regions have also implemented them. Furthermore, 40.6% of HEIs have been using LMS for 1–5 years, 35.3% for less than one year, and 24.1% for more than five years. In terms of institutional type, 55.9% of LMS users are from private higher education institutions (HEIs), while 44.1% are from public HEIs. The highest concentration of LMS users is in Java (32.3%), followed by Kalimantan (24.7%), Sumatra (15.9%), Bali (11.8%), Sulawesi (8.2%), and Papua (7.1%).

Table 2. Respondent Profile

	N	%
Operating area		
Rural	24	14,1
Urban	131	77,1
Coast	15	8,8
Total	170	100
Provinces		
Sumatera	27	15,9
Kalimantan	42	24,7
Java	55	32,3
Sulawesi	14	8,2
Papua	12	7,1
Bali	20	11,8
The Period of Employment of LMS		
<1 Year	60	35,3
1-5 Years	69	40,6
> 5Years	41	24,1
Total	170	100
Institution/Uni/Higher Edu		
Private	95	55,9
Public	75	44,1
Total	170	100

The hypothesis testing results in Table 3 also indicate significant relationships between the examined variables. Hypothesis 1 shows a relationship between KS → KP with a significant value of $\alpha = 0.000$, confirming that Hypothesis 1 is accepted. Hypothesis 2 shows a relationship between KI → KP with a significant value of $\alpha = 0.012$, confirming that Hypothesis 2 is accepted. Hypothesis 3 shows a relationship between KL → KP with a significance value of $\alpha = 0.000$, confirming that Hypothesis 3 is accepted. Hypothesis 4 shows a relationship between KP → NB with a significant value of $\alpha = 0.000$, confirming that Hypothesis 4 is accepted.

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Table 3. Hypothesis Result

Hypothesis		Beta	t	p	Decision
Factors users' satisfaction					
H1	SQ->US	0,250	5,078	0,000	Accepted
H2	IQ -> US	0,084	1,552	0,012	Accepted
H3	SERVQ -> US	0,251	4,068	0,000	Accepted
Factor affecting Benefit					
H4	US -> NB	0,842	13,035	0,000	Accepted
Mediating effect					
H5a	SQ -> US -> NB	0,4	2,645	0,024	Accepted
H5b	IQ-> US-> NB	0,264	4, 720	0,001	Accepted
H5c	SERVQ -> US -> NB	0,285	5,671	0,000	Accepted

This study aims to test causal relationships through mediation analysis using SEM-PLS, examining the relationships between System Quality, Information Quality, Service Quality, User Satisfaction, and the Net Benefit of LMS for users in higher education institutions in Indonesia. The findings indicate that System Quality significantly influences User Satisfaction (H_1 accepted). This aligns with the study by Sumarningsih [13], which states that System Quality, Information Quality, and Service Quality impact User Satisfaction because they facilitate users' tasks. The results also show that Information Quality significantly influences User Satisfaction (H_2 accepted). This finding supports the study by Melgis [14], which suggests that users gain knowledge and ease in utilizing the system effectively.

Additionally, Service Quality significantly influences User Satisfaction (H_3 accepted). This outcome aligns with the conclusions drawn in Pereira's study [15], which highlights that high-quality service within a system contributes to sustained user satisfaction. Moreover, User Satisfaction has a significant impact on Net Benefit for users (H_4 accepted). This aligns with the research by Sumarningsih [13], which emphasizes the critical role of satisfaction in determining the benefits an institution gains from the system. Furthermore, this study confirms that User Satisfaction mediates the relationship between System Quality, Information Quality, and Service Quality on the Net Benefit received by HEIs through the LMS (H_5 accepted), with significant results. This finding supports the study by Diana [16], which asserts that when users experience satisfaction with a well-designed and informative system, they can derive substantial benefits in terms of financial savings, time efficiency, and work effectiveness.

CONCLUSION

This study analyzes the effectiveness of LMS with variable of information quality, system quality, and service quality on the satisfaction and net benefits of higher education institutions in Indonesia by using PLS-SEM as data analytic technique. The findings conclude that system quality, information quality, and service quality have a significant influence on user satisfaction. Furthermore, user satisfaction has a positive and significant impact on the benefits experienced by higher education institutions in Indonesia. In other words, satisfaction plays a mediating role in this study. This research provides valuable insights for higher education institutions to keep maintaining the quality of systems, information, and services of LMS to ensure the best academic services. Higher education institutions should pay attention to enhance their

LMS to support teaching and learning process. With this digital transformation, academic activities are expected to run more efficiently and improve users' productivity.

However, this study has limitations in terms of the sample size and the scope of respondents. Therefore, including respondents from other sectors could provide broader insights into future research. Additionally, this study suggests incorporating theoretical approaches such as UTAUT and the Diffusion of Innovation theory to better explain LMS adoption and related phenomena. Longitudinal data analysis is also recommended to obtain more comprehensive and robust results.

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BIBLIOGRAPHY

[1] J. Pereira, J. Varajão, and N. Takagi, "Evaluation of Information Systems Project Success–Insights from Practitioners," *Information Systems Management*, vol. 39, no. 2, pp. 138–155, 2022, doi: 10.1080/10580530.2021.1887982.

[2] J. Varajão, J. C. Lourenço, and J. Gomes, "Models and methods for information systems project success evaluation – A review and directions for research," *Heliyon*, vol. 8, no. 12, Dec. 2022, doi: 10.1016/j.heliyon.2022.e11977.

[3] K. Çelik and A. Ayaz, "Validation of the Delone and McLean information systems success model: a study on student information system," *Educ Inf Technol (Dordr)*, vol. 27, no. 4, pp. 4709–4727, May 2022, doi: 10.1007/s10639-021-10798-4.

[4] C. N. Alam, S. J. Putra, B. Subaeki, A. B. A. Rahman, T. K. A. Rahman, and Y. Suryana, "Combining readiness and success constructs for exploring the information system implementation performance: A model development," in *Journal of Physics: Conference Series*, Institute of Physics Publishing, Dec. 2019. doi: 10.1088/1742-6596/1402/2/022086.

[5] N. P. D. Pratiwi, D. Ariyanto, I. N. W. A. Putra, and N. P. S. H. Mimba, "Penilaian Kesuksesan Penerapan Xero Accounting Software Dengan Model UTAUT dan Delone & McLean," *E-Jurnal Akuntansi*, vol. 32, no. 2, p. 3764, Feb. 2022, doi: 10.24843/eja.2022.v32.i02.p13.

[6] L. H. M. Wong, L. Hurbean, R. M. Davison, C. X. J. Ou, and M. Muntean, "Working around inadequate information systems in the workplace: An empirical study in Romania," *Int J Inf Manage*, vol. 64, p. 102471, 2022, doi: https://doi.org/10.1016/j.ijinfomgt.2022.102471.

[7] A. Rachmat, B. Hamzah, and M. Niswar, "Evaluation of Academic

Information System Using Delone and Mclean Success Model: A Case Study of Academic Information System Hasanuddin University," 2022.

[8] M. A. Kristy, P. I. Santosa, and R. Ferdiana, "A Model for Understanding Mandatory System Implementation: A Literature Review," *JATISI (Jurnal Teknik Informatika dan Sistem Informasi)*, 2022.

[9] Z. Iba and A. Wardhana, "Skala Pengukuran & Instrumen Penelitian," 2024, pp. 198–240.

[10] G. W. Cheung, H. D. Cooper-Thomas, R. S. Lau, and L. C. Wang, "Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations," *Asia Pacific Journal of Management*, 2023, doi: 10.1007/s10490-023-09871-y.

[11] M. Sarstedt, C. Ringle, and J. Hair, "Partial Least Squares Structural Equation Modeling," 2021, pp. 1–47. doi: 10.1007/978-3-319-05542-8_15-2.

[12] S. M. Rasoolimanesh, "Discriminant validity assessment in PLS-SEM: A comprehensive composite-based approach," pp. 1–8, Feb. 2022.

[13] E. Y. Sumarningsih, C. Hudaya, and K. Hermanto, "Mengukur Kesuksesan Penggunaan SIAKAD Menggunakan Model DeLone & McLean di Universitas Teknologi Sumbawa," *Jurnal Ilmu Sosial dan Pendidikan (JISIP)*, vol. 6, no. 4, pp. 2598–9944, 2022, doi: 10.36312/jisip.v6i4.3661/http.

[14] S. A. Melgis, R. Aryani, D. Lestari, and M. N. A. Abdulnazar, "Analyzing the Quality of Academic Information Systems on System Success," *INTENSIF: Jurnal Ilmiah Penelitian dan Penerapan Teknologi Sistem Informasi*, vol. 8, no. 1, pp. 140–161, Feb. 2024, doi: 10.29407/intensif.v8i1.21512.

[15] J. Pereira, J. Varajão, and N. Takagi, "Evaluation of Information Systems Project Success – Insights from Practitioners," *Information Systems Management*, vol. 39, no. 2, pp. 138–155, Apr. 2022, doi: 10.1080/10580530.2021.1887982

[16] R. Diana, I. V. Paputungan, and A. Luthfi, "Integration of TAM and DeLone and McLean Models to Evaluate the Quality of NAMPAH Applications," *Jurnal Teknologi Dan Sistem Informasi Bisnis*, vol. 6, no. 4, pp. 723–731, Oct. 2024, doi: 10.47233/jteksis.v6i4.1583.