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Analysis of the Quality and Ease of Use of Moodle-Based Learning Management System Application Using Delone and Mclean Model (Case Study of Academic Administrator and Training Administrator of Digital Talent Scholarship Program 2023)

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Abstract**—** *Learning Management System (LMS) is an online learning platform provided by the Ministry of Communication and Information (KEMKOMINFO) for the DTS (Digital Talent Scholarship) Training program. Analysis of the quality and ease of use of the platform is carried out to evaluate the extent to which this system meets user expectations and needs. The DeLone McLean model is used in this research to analyze system quality which consists of six variables, namely information quality, system quality, service quality, usage, user satisfaction and net benefits. Data collection was carried out by distributing questionnaires to a sample of 110 system user administrators via Google form. The research method used is Structural Equation Modeling (SEM) with the Partial Least Square (PLS) approach and SmartPLS 3.2.9 software to analyze the data. Based on the results of the analysis, it was concluded that of the 9 hypotheses tested, six hypotheses were accepted and three hypotheses were rejected. The quality of information is considered unreliable, resulting in less user satisfaction. The quality of the system is considered less easy to understand so there is less interest in using the system. The quality of service is considered poor so there is less interest in using the LMS platform.*

Keywords**—** *System Quality Analysis, DeLone and McLean, Learning Management System.*

I. INTRODUCTION

Education and information technology have experienced rapid development in recent years. In this digital era, technology-based learning is increasingly becoming a trend, and educational institutions are starting to switch to online learning platforms. Learning Management Systems (LMS) have become a popular solution for educational institutions to provide digital learning environments that are interactive, efficient, and accessible from anywhere [1].

LMS DTS (Digital Talent Scholarship) is an online learning platform provided by the Ministry of Communication and Information (KEMKOMINFO) for the DTS Training program. LMS is web-based software that can provide various learning content, such as materials, assignments, quizzes and exams, which can be accessed by participants, teachers, training administrators and academic administrators online [2].

In the DTS program, there are administrators who manage users on the LMS platform. In this program, as of September 11 2023 there are 35 active academic administrators and 115 active training administrators. LMS has become a critical component in the learning approach used. KEMKOMINFO must be able to ensure that the LMS used meets high quality standards and provides a comfortable and effective user experience.

There is an open source LMS platform that can be used by anyone and can be modified according to what they want, namely Moodle. Moodle is an open source based CMS which is currently commonly used by various training institutions and universities as a learning place for students/course participants. Moodle is currently used by more than 2000 educational organizations worldwide. Moodle can be used as the main learning medium or is also commonly used as an additional option besides face-to-face learning [3].

Based on the description above, the idea arose to analyze the quality and ease of the Moodle-based DTS LMS application using the DeLone and McLean method to support administrators in managing users (participants and teachers) as well as preparing courses in the LMS for DTS training.to support the success of future training programs.

II. RESEARCH METHODS

Fig. 1. Research Flow.

This research uses quantitative research by collecting survey data. The stages of research implementation can be seen in (Figure 1). The first stage in this research is observation, which involves observing the obstacles faced by Moodle LMS system administrators. Information about these

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obstacles was obtained through participation in WhatsApp help groups for system use, where various problems were discussed and solutions were sought. After observations are made, the next step is problem formulation.

The next stage is preparing the questionnaire. Indicators related to these variables are detailed in statements that will be included in the questionnaire. This questionnaire was then distributed via Google Form to LMS system users, especially academy and training admins. The next stage is testing the validity and reliability of the instrument, which is carried out to assess the suitability of the questionnaire that has been distributed. This process involves the use of the SmartPLS statistical analysis application.

Next, the system assessment results obtained from the questionnaire will be processed and analyzed using the SmartPLS application. From this analysis process, conclusions will be drawn regarding the condition of the Moodle LMS system and the obstacles faced by administrators. The final stage in this research is drawing up conclusions and suggestions. Conclusions are drawn from the analysis data, while suggestions are given as recommendations for improvements to the obstacles that have been identified during the research.

III. Result and Discussion

A. Respondent Profile

Distribution of the questionnaire was carried out using Google Form with a Likert scale for each statement item [4]. Distribution was carried out to 110 system user admin respondents. Respondent profile data which is the object of research can be seen in table 1.

TABLE I. Profile of Research Respondents.

Category	Choice	Amount
Age	< 25	21
	25 - 35	77
	> 35	12
Gender	Man	61
	Woman	49
Academy	Fresh Graduate Academy (FGA)	15
	Vocational School Graduate Academy (VSGA)	22
	Professional Academy (PROA)	4
	Thematic Academy (TA)	22
	Digital Leadership Academy (DLA)	8
	Talent Scouting Academy (TSA)	13
	Digital Entrepreneurship Academy (DEA)	13
	Government Transformation Academy (GTA)	13
Administrator role	Academy Administrator	29
	Training Administrator	81

B. SmartPLS Analysis tool

The analytical tool used in this research is SmartPLS software version 3.2.9. Two tests were carried out on SmartPLS, namely validity and reliability testing and then hypothesis testing [5]. Validity and reliability testing was carried out on 30 initial respondent data to test the questionnaire statements. After the questionnaire statements were declared valid the questionnaire was distributed again to 110 respondents for the results to be tested for hypotheses.

C. PLS-SEM Result

PLS-SEM results based on processed questionnaire data can be seen in Figure 2.

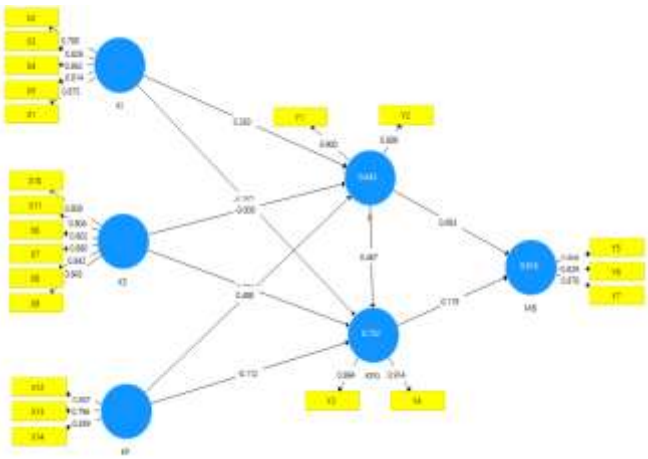

Fig. 2. Results of PLS-SEM analysis.

D. Evaluation of the Measurement Model (Outer Model)

Evaluation of the measurement model (outer) model is carried out to determine the relationship between variables and their indicators [6]. Evaluation with this model includes testing the validity and reliability of the questionnaire data that has been obtained.

1. Convergent Validity Test

Convergent validity can be seen from the Outer Loading value contained in the smartPLS calculation. The criteria for the loading factor value must be greater than 0.70 for the convergent validity test to be valid [6]. Based on smartPLS calculations, the Outer Loading load value is in Table II.

TABLE III. Outer Loading Values.

Variable	Indicator	Payload	Information
Information Quality (Information quality = KI)	X1 = Completeness	0.875	Valid
	X2 = Precision	0.780	Valid
	X3 = Reliability	0.826	Valid
	X4 = Currency	0.862	Valid
	X5 = Format of Output	0.814	Valid
System Quality (System Quality = KS)	X6 = System Flexibility	0.902	Valid
	X7 = System Integration	0.880	Valid
	X8 = Time to Respond	0.842	Valid
	X9 = Error Recovery	0.843	Valid
	X10 = Convenience of Access	0.808	Valid
	X11 = Language	0.804	Valid
Service Quality (Service Quality = KP)	X12 = Assurance	0.897	Valid
	X13 = Empathy	0.796	Valid
	X14 = Responsiveness	0.859	Valid
Use (Usage = P)	Y1 = Daily Used	0.900	Valid

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	Time		
	Y2 = Frequency of Use	0.886	Valid
User Statisfaction (User satisfaction = KPG)	Y3 = Repeat Purchases	0.884	Valid
	Y4 = Repeat Visits	0.914	Valid
Net Benefit (Net Benefit = MB)	Y5 = Speed of completing task	0.908	Valid
	Y6 = Job performance	0.829	Valid
	Y7 = Effectiveness	0.878	Valid

The convergent validity test is also considered valid if the AVE value ≥ 0.5. Table III shows the AVE value.

TABLE III. AVE Value.

Construct	AVE	Information
KI	0.692	Valid
K.S	0.726	Valid
KP	0.808	Valid
P	0.718	Valid
KPG	0.761	Valid
MB	0.797	Valid

2. Discriminant Validity Test

The discriminant validity test can be done by looking at the cross loading results. In the smartPLS application, the cross loading value is said to be valid if the variable loading value is the largest compared to other variables [6]. In this study, the results of cross loading can be seen in Table IV.

TABLE IV. Cross Loading Score.

	KI	K.S	KP	P	KPG	MB
X1	0.875	0.679	0.595	0.761	0.600	0.595
X2	0.780	0.411	0.485	0.604	0.397	0.460
X3	0.826	0.564	0.605	0.664	0.540	0.497
X4	0.862	0.658	0.503	0.682	0.733	0.687
X5	0.814	0.613	0.465	0.623	0.722	0.743
X6	0.694	0.643	0.761	0.902	0.598	0.595
X7	0.676	0.615	0.745	0.880	0.564	0.576
X8	0.648	0.610	0.795	0.842	0.583	0.512
X9	0.602	0.621	0.662	0.843	0.587	0.591
X10	0.786	0.772	0.620	0.808	0.897	0.667
X11	0.677	0.794	0.546	0.804	0.742	0.561
X12	0.629	0.897	0.616	0.707	0.801	0.700
X13	0.527	0.796	0.534	0.612	0.659	0.555
X14	0.656	0.859	0.596	0.701	0.717	0.667
Y1	0.670	0.719	0.654	0.632	0.726	0.900
Y2	0.624	0.628	0.668	0.596	0.666	0.886
Y3	0.528	0.553	0.884	0.736	0.449	0.614
Y4	0.613	0.671	0.914	0.736	0.672	0.711
Y5	0.698	0.712	0.543	0.733	0.908	0.627
Y6	0.510	0.734	0.498	0.596	0.829	0.685
Y7	0.701	0.783	0.606	0.701	0.878	0.721

3. Reliability Test

In the reliability test, there is composite reliability which is used to test the reliability value of the variable. composite reliability if the composite reliability value is > 0.6. The Cronbach's Alpha value was also checked. A variable is declared reliable or meets Cronbach's Alpha if the Cronbach's Alpha value is > 0.7 [6]. Table V shows the results of Cronbach's alpha and composite reliability in the study.

TABLE V. Cronbach's alpha and composite reliability results.

Construct	Cronbach's Alpha	Composite Reliability
KI	0.889	0.918
K.S	0.811	0.888
KP	0.764	0.894
P	0.921	0.938
KPG	0.842	0.905
MB	0.745	0.887

E. Structural Model Evaluation (Inner Model)

Evaluation of the inner model can be done with the Determination Coefficient R^2 (R-Square), Predictive Relevance Q^2 (Q-Square), and Goodness of Fit (GoF) [7].

1. Coefficient of Determination R^2 (R-Square)

The R-Square value of a variable is stated to be influenced by the connected variable if the R-Square value is > 0.500 [7]. Table VI shows the results of the R-Square values in the study.

TABLE VI. Value R-Square.

Variable	R Square
P	0.643
KPG	0.752
MB	0.616

2. Predictive Relevance Q^2 (Q-Square)

The model has Predictive Relevance If the Q-Square value > 0 and vice versa if the Q-Square value < 0 then the model lacks Predictive Relevance [7]. The Q-Square value is calculated using the formula:

$$Q^2 = 1 - (1 - R_1^2)(1 - R_2^2) \dots \left(1 - R_p^2\right)$$

In this study, the Q2 values obtained were:

$$Q^2 = 1 - (1 - 0{,}643)(1 - 0{,}752)(1 - 0{,}616)$$
$$Q^2 = 1 - (0{,}357)(0{,}248)(0{,}384)$$
$$Q^2 = 1 - (0{,}033997824)$$
$$Q^2 = 0{,}96$$

3. Goodness of Fit (GoF)

The GoF value stretches from 0 – 1 with the interpretation of the value divided into 3, namely, the GoF value = 0.1, which is small, the GoF value = 0.25, which is medium, and the GoF value = 0.36.[7]. Table VII shows the results of calculating the average communalities and R-Square values.

TABLE VII. Average Communalities and R-Square Values.

Construct	Communalities	R Square
KI	0,692	
K.S	0,718	
KP	0,726	
P	0,797	0,643
KPG	0,808	0,752
MB	0,761	0,616
Average	**0,750**	**0,670**

Based on the average value table above, the GoF value search results are as follows:

$$GoF = \sqrt{\bar{x}com \times \bar{x}R^2}$$
$$GoF = \sqrt{0{,}750 \times 0{,}670}$$
$$GoF = \sqrt{0{,}5025}$$

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$$GoF = 0{,}708$$

F. Hypothesis Testing

Hypothesis testing is carried out using the Bootstrapping method in the SmartPLS application. The T-Statistics results obtained were compared with the T-table values [8]. The df value is the same as the number of samples used, namely 110. The test type used is two-tailed and the significance level used is 5% (0.05). Then the T-table value was 1.981. The hypothesis will be accepted if the T-Statistics value > T-Table (1.981). Table 8 shows the results of the T-Statistics coefficients and paths.

TABLE VII. T-Statistics Coefficients and Paths.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	Results
KI-P	0.456	0.462	0.141	3,239	Rejected
KI-KPG	-0.001	0.001	0.127	0.005	Rejected
KS-P	0.003	-0.030	0.190	0.018	Rejected
KS-KPG	0.421	0.424	0.126	3,333	Accepted
KP-P	0.263	0.299	0.159	1,651	Accepted
KP-KPG	0.199	0.201	0.097	2,046	Accepted
P-KPG	0.274	0.260	0.090	3,033	Accepted
P-MB	0.271	0.283	0.112	2,427	Accepted
KPG-MB	0.527	0.518	0.096	5,499	Accepted

IV. CONCLUSION

Based on the research that has been carried out, the analysis results obtained in hypothesis testing are that there are six hypotheses that are accepted or have a significant effect because they have a T-statistic value greater than the T-Table (1.981), namely the Information Quality variable on usage, system quality on user satisfaction, user quality towards user satisfaction, use towards user satisfaction, use towards net benefits, and user satisfaction towards net benefits. There were three hypotheses that were rejected or had no significant effect because they had a T-statistic value smaller than the T-Table, namely the information quality variable on user satisfaction, system quality on usage, and service quality on user satisfaction. The conclusion of this research is that the quality of the information is considered to be unreliable, resulting in less user satisfaction, the quality of the system is considered less easy to understand so interest in using the system is considered less, then the quality of service is considered less so there is less interest in using the LMS system.

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