Delone and McLean Models for measuring the success of Flores University e-learning information system

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Abstract: The University of Flores first conducted E-Learning learning amid the covid 19 pandemic, the problem faced was that most of the lecturers at the University of Flores did not understand E-learning by using information technology. The Faculty of Information Technology facilitated all faculties at the university to conduct e-training. E-Learning, in the learning process. The aim is to measure success in implementing the University of Flores E-Learning information system. The model in this study is the Delone and Mclean model to measure success with six dimensions, namely, system quality, information quality, users, service quality, user satisfaction, net benefits. The method in this research is observation, a survey using questionnaires in the form of a Likert scale, and a literature study. The data analysis technique used simple linear regression. The results showed that the Delone and Mclean models were very well used to measure the success of using e-learning. The conclusion is that the quality of information on the use percentage of 34.4%, the quality of service they use of 33.8%, the quality of the system on the satisfaction of the users is 38.6%, and the quality of the services on the satisfaction of the users 34,5%, the users on the satisfaction of the users 43,4%, use of net benefits is 58.7% and user satisfaction of net benefits is 48.8%. The higher the value of these variables, the higher the success rate of information systems using E-learning at universities will be.

Keywords: Delone and Mclean Model, information systems success, e-learning

Introduction

The Covid-19 pandemic has forced the government to issue a new policy to stop the spread of Covid-19, namely implementing public invitations to carry out physical distancing or keeping other people one meter apart and avoiding crowds and various meeting events that lead to associations [Covid-19, 2020]. The government also implements a policy to stay at home or Work From Home (WFH) and activities related to gatherings or gatherings

In this condition, all lecturers are required to replace learning using E-Learning. Various platforms are used for teaching so it needs to be supported by good learning facilities and the use of information technology [1]. Most of the lecturers at the University of Flores do not understand E-learning using information technology, so the Faculty of Information Technology at the University of Flores facilitates all faculties at the university to conduct training using E-Learning in presenting information related to the lecture process. Face-to-face online learning through applications is the most profitable thing to stop the spread of Covid-19, as well as maintain the health and safety of lecturers and students from exposure to the virus [2].

The success of the E-learning learning information system amid the Covid 19 pandemic, for Lecturers is very necessary to support all learning processes at the University of Flores. This E-learning Information System can be accessed by all lecturers at the University of Flores to include all learning materials so that the online learning process can run effectively and efficiently [3]. All students can access all information related to online learning. Measurement of information systems is needed by the University to know the added value for Higher Education [4].

The University of Flores is conducting E-Learning lessons for the first time amid the covid 19 pandemic. Researchers analyzed to measure the level of learning success using the Delone and Mclean models by measuring the success factors, namely: System Quality, Information Quality, Service Quality, Actual Use, Use Statistics, Net Benefits [5]. The role of information systems in an organization or college is no longer in doubt, its support can provide universities a competitive advantage to compete with other universities using information systems.

Methodology
Research Subject
The research subjects discussed in this study were all lecturers at the University of Flores as users of information systems. The measurement of level of success is measured based on the Delone and Mclean Model using six characteristics that aim to evaluate and find out the extent of success in implementing the University of Flores E-Learning information system.

Research Design
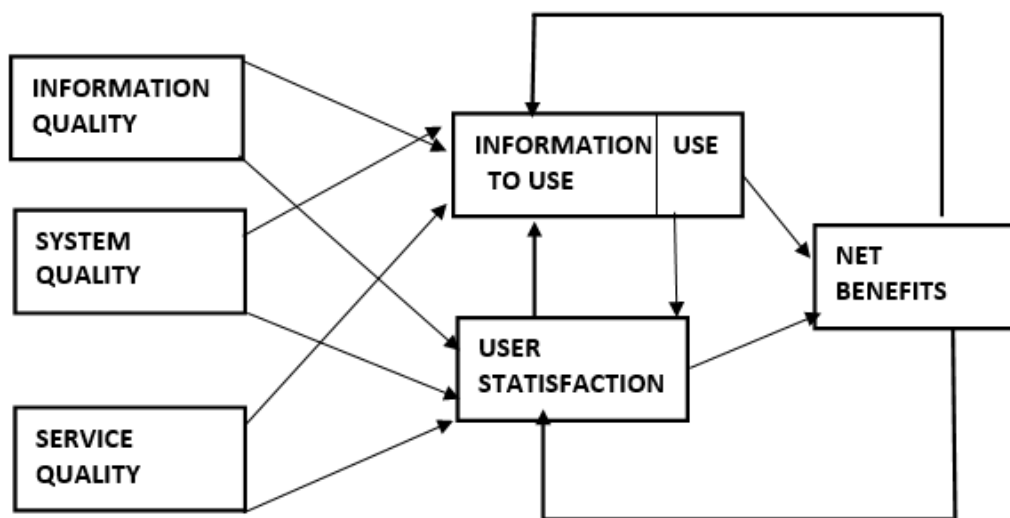
Figure 1. Information system success model

Figure 1 shows the D&M Information System Success, this model has six interconnected dimensions

Method of collecting data
Data collection methods used in this research are observation, a survey using questionnaires, literature study [6]. The analysis technique uses simple linear regression [7].

Population and sample
The population used in this study were all lecturers at the University of Flores as users of the E-Learning information system. The sampling technique is a random sampling technique in determining the number of samples using the Slovin formula so that the sample used is =204.

Validity and Reliability Test
A validity test is used to measure whether a questionnaire is valid or not from a statement that can reveal something that will be measured from the questionnaire. The research instrument is said to be valid if, the product-moment correlation coefficient exceeds 0.367, the product-moment correlation coefficient> r-table (α, ; n-2) n = number of samples, Sig value [8]. The formula for testing the validity of the instrument is as follows:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{(n\sum(x)^2 - (\sum x)^2)\,(n\sum(y)^2 - (\sum y)^2)}}$$

(1)

Description :

r   : Correlation coefficient r pearson
n   : Number of samples/observations
x   : Independent variable/first variable
y   : Dependent variable/second variabled́

The validity data of calculating are as follows:

Table 1. Validity test

Case Processing Summary		N	%
Cases	Valid	204	100.0
	Excluded[a]	0	0.0
	Total	204	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Test

To calculate the reliability measurement using Cronbach's Alpha, with this technique if the reliability coefficient with r value > 0.600. For the calculation process using SPSS[9]. Cronbach's Alpha formula is as follows:

$$r11 = \left(\frac{k}{(k-1)}\right)\ (1 - \frac{\sum \sigma t^2}{\sigma t^2})$$

(2)

Description :

r 11   : Instrument reliability
k   : number of questionnaire items
$\sum \sigma t^2$: number of item variants
σt2   : Total Variants

Croanbach's alha table is as follows:

Table 2. Reliability Test

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.056	0.963	35

After compiling the questionnaire and testing the validity, reliability, and distributing questionnaires to all lecturers at the University of Flores using E-Learning, the next step is to conduct an analysis.

Results and Discussions

This study was adapted from the information system success model developed by Delone and Mclean. This study uses six variables consisting of system quality, information quality, service quality, usage, user satisfaction, and net benefits. The purpose of this study was to determine

the effect of these variables in the use of the University of Flores' E-Learning information system. This study has nine hypotheses to see which variables affect the success of the University of Flores E-Learning information system.

1.   System Quality to Use

From the results of a simple linear regression test on the system quality variable (System Quality) to the user (Use), the value is obtained from F count > T table.

Table 3. Coefficient of system quality to users

Coefficients					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.300	0.057		5.223	0.000
	NZXI	0.593	0.058	0.587	10.298	0.000
a. Dependent Variable: NZY1						

From the ANOVA test by paying attention to R Square, the regression coefficients that are generated with t-count values of 5.223 and 10.298 with a significance of 0.000, show that the quality of the system affects the use of each with a significant coefficient.

Table 4. ANOVA test

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.958	1	30.958	106.059	0.000b
	Residual	58.964	202	0.292		
	Total	89.922	203			
a. Dependent Variable: ZUSE						
b. Predictors: (Constant), ZKS						

The results of the ANOVA test show F count 106,059 with a significant 0.000, then compared with F table with df numerator of 1 and df denominator 202 with a significant level of 0.05 is 3.04, it is very clear that F count > F table 4. So it can be concluded that the quality of the system is very influential on its use. This is in line with research conducted by [10] if the quality of the system is good, then user satisfaction will increase.

2.   Information Quality on Use

Table 5. System quality to users

Coefficients^a					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.351	0.057		6.108	0.000
	NZX2	0.538	0.058	0.549	9.334	0.000
a. Dependent Variable: NZY1						

By looking at the R Square value with a model of 0.301 or 30.1%, the quality of information does not significantly affect the use. The resulting model with t-count values of 6.108 and 9.334 with a significance of 0.000 shows that each coefficient has no significant effect on the use. The quality of information with a B value of 0.351 while the effect on the use of 0.538.

Table 6. ANOVA test

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.098	1	27.098	87.130	0.000b
	Residual	62.824	202	0.311		
	Total	89.922	203			

a. Dependent Variable: ZYU

b. Predictors: (Constant), ZX2KI

Table 7. Summary model

Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.549a	0.301	0.298	0.55768	0.301	87.130	1	202	0.000

a. Predictors: (Constant), ZX2KI

b. Dependent Variable: ZYU

The results of the ANOVA test F Count = 87,130 with a significant 0.000, then compared with Ftable with df the numerator of 202 and df of the denominator 203 at 0.05, the value of which is 3.04 so it can be concluded that the information quality variable has an effect on usage but is less significant on usage because by looking at the R-value Square of 0.301. This result shows that the higher the quality of the information used, the higher the use of e-learning amid the COVID-19 pandemic [11].

3. Quality of service to use

Table 8. ANOVA test

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.412	1	30.412	103.230	0.000b
	Residual	59.510	202	0.295		
	Total	89.922	203			

a. Dependent Variable: ZKUse

b. Predictors: (Constant), ZKPEL

From the results of the F test, the calculated F value is 103,230 with a significant level of 0.000, then compared with the F table with df numerator 1 and df free denominator 202 with a significant level of 0.05 whose value is 3.04. it seems very clear that F count = 103.230 > from F table 3.04, so it can be concluded that the quality of service is very influential on usage.

Table 9.Coefficients

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.322	0.056		5.717	0.000
	ZKPEL	0.574	0.056	0.582	10.160	0.000
a. Dependent Variable: ZKUse						

The resulting model with a t value of 5.717 > 0.056 and a significance of 0.05 (0.000 < 0.05) so it can be concluded that the quality of service is very influential on usage. The results of this study are in line with research conducted by [11] the better the quality of service in the learning process with e-learning, the better an increase in the use of e-learning.

4.   System Quality on user satisfaction

Table 10. Summary Model

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.621^a	0.386	0.383	0.50521	0.386	126.817	1	202	0.000
a. Predictors: (Constant), ZKS									
b. Dependent Variable: ZKP									

By looking at the correlation R of 0.621 the effect of system quality on user satisfaction. The coefficient of determination is 0.383 with the understanding that the effect of the independent variable on the dependent variable is 38.3%, while the rest is influenced by other variables.

Table 11. ANOVA test

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.369	1	32.369	126.817	0.000^b
	Residual	51.558	202	0.255		
	Total	83.927	203			
a. Dependent Variable: ZKP						
b. Predictors: (Constant), ZKS						

Table 11 shows that the calculated F value = 126,817 > from Ftable 3.04 with a probability level of 0.000 < 0.05, regression can be used to predict the participation variable.

Table 12.Coefficients

Coefficientsª

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.309	0.054		5.762	0.000
	ZKS	0.606	0.054	0.621	11.261	0.000
a. Dependent Variable: ZKP						

Table 12 shows the value of t arithmetic = 5.762 with a significant value of 0.000 <0.05, then rejecting H0 and accepting H1 means that there is an influence between system quality and user quality. The results of research conducted by[12] show that the better the quality of the e-learning system used, the better the satisfaction of e-learning users at the University of Flores.

5.   Information Quality on User Satisfaction

Table 13. Summary Model

Model Summaryᵇ

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.404ª	0.163	0.159	0.58970	0.163	39.345	1	202	0.000
a. Predictors: (Constant), ZKI									
b. Dependent Variable: ZKP									

The correlation value R = 0.404 shows the percentage of the influence of information quality on user satisfaction by looking at the coefficient of determination R Square of 0.163, implying that the influence of information quality on user satisfaction is 16.3%, not too significant.

Table 14. ANOVA test

ANOVAª

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.682	1	13.682	39.345	0.000ᵇ
	Residual	70.245	202	0.348		
	Total	83.927	203			
a. Dependent Variable: ZKP						
b. Predictors: (Constant), ZKI						

From the ANOVA test and paying attention to R Square 0.163, which is less significant, the resulting coefficient is not good, so it cannot be used for analysis. So it can be concluded that the quality of information does not significantly affect the user. This is because the University of Flores is already using e-learning, but only some of the lecturers use e-learning. This research is in line with [13].

6.   Service Quality on User Satisfaction

Table 15. Summary Model

					Model Summaryb					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.588a	0.345	0.342	0.52155	0.345	106.534	1	202	0.000	
a. Predictors: (Constant), ZKP										
b. Dependent Variable: ZKPM										

The correlation value R = 0.588 shows the percentage of the influence of service quality on user satisfaction with a coefficient of determination R Square = 0.345, that the effect of service quality on user satisfaction is 34.5% and the rest is influenced by other variables.

Table 16. ANOVA test

					ANOVAa		
Model		Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	28.979	1	28.979	106.534	0.000b	
	Residual	54.948	202	0.272			
	Total	83.927	203				
a. Dependent Variable: ZKPM							
b. Predictors: (Constant), ZKP							

The calculated F value = 106.534 with a probability of 0.000 <0.05, then the regression model can be used. This value is then compared with the value of Ftable 3.04. It seems very clear that Fcount = 106,534 is greater than Ftable = 3.04, so it can be concluded that service quality is very influential on user satisfaction. This research is in line [14], showing that there is an influence between service quality on user satisfaction.

7.   Users to User Satisfaction

Table 17. Summary Model

					Model Summaryb					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.658a	0.434	0.431	0.48511	0.434	154.638	1	202	0.000	
a. Predictors: (Constant), NZP										
b. Dependent Variable: NZKP										

The correlation value R = 0.658 shows the percentage of the effect of the use on user satisfaction with a coefficient of determination R Square = 0.434, which means that there is a 43.4% effect of usage on very good user satisfaction and the remaining 56.6% is influenced by other variables.

Table 18. ANOVA test

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.391	1	36.391	154.638	0.000b
	Residual	47.536	202	0.235		
	Total	83.927	203			
a. Dependent Variable: NZKP						
b. Predictors: (Constant), NZP						

The calculated F value = 154.638 with a probability level of 0.000 <0.05, then this model can be used to predict the participation variable. The value of t count = 5.690 with a significance of 0.000 <0.05, rejecting H0 and accepting H1. It can be concluded that the user is very influential on user satisfaction. The results of this study are in line with research conducted by [15] there is a user influence on user satisfaction.

8.   Use against Net Benefits

Table 19. Summary Model

Model Summaryb									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.766a	0.587	0.585	0.39566	0.587	286.732	1	202	0.000
a. Predictors: (Constant), NZP									
b. Dependent Variable: NZNB									

The value of R = 0.766 indicates that the effect of the use on net benefits is quite significant with a coefficient of determination R Square = 0.587, that the effect of the use on net benefits of 58.7% is very good to use and the remaining 41.3% is influenced by other variables

Table 20. ANOVA test

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.888	1	44.888	286.732	0.000b
	Residual	31.623	202	0.157		
	Total	76.511	203			
a. Dependent Variable: NZNB						
b. Predictors: (Constant), NZP						

From the Anona test by looking at the value of R square = 0.587, then the calculated F value = 286.732 with a probability of 0.000 <0.05, the regression model can be used. This value is then compared with the value of Ftable 3.04. It seems very clear that Fcount = 286.732 is greater than Ftable = 3.04, so it can be concluded that the use has a great effect on net benefits. The results of this study conducted by [16], there is an effect of the use on net benefits.

9.   User Satisfaction with Net Benefits

Table 21. Summary Model

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.699 a	0.488	0.486	0.44020	0.488	192.839	1	202	0.000

a. Predictors: (Constant), NZK

b. Dependent Variable: NNB

The value of R = 0.699 indicates that the percentage of the effect of user satisfaction on net benefits with a coefficient of determination R Square = 0.488 or 48.8% of user satisfaction on net benefits and the remaining 51.2% is influenced by other variables.

Table 22. Anova test

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.368	1	37.368	192.839	0.000^b
	Residual	39.143	202	0.194		
	Total	76.511	203			

a. Dependent Variable: NNB

b. Predictors: (Constant), NZK

The value of R = 0.699 indicates that the percentage of the effect of user satisfaction on net benefits with a coefficient of determination R Square = 0.488 or 48.8% of user satisfaction on net benefits and the remaining 51.2% is influenced by other variables. The calculated F value = 192.839 with a probability level of 0.000 <0.05, then this model can be used to predict other variables. Thus the value of F count = 192.839 > from F table = 3.04, then user satisfaction is very influential on net benefits. The results of this study are in line with research conducted by [17] showing that user satisfaction has a significant effect on net benefits.

Conclusion

This study uses the Delone and Mclean model to measure the success of the University of Flores E-Learning information system by looking at the influence of each variable that exists in the Delone and Mclean model, the results of the analysis of the success of its application based on the discussion above can be concluded that: variables that have a large and positive effect on the success of the E-Learning information system at the University of Flores, namely the variable quality of information on use with a percentage of 34.4%, service quality on use 33.8%, system quality on user satisfaction 38.6%, service quality to user satisfaction 34.5%, user satisfaction to user satisfaction 43.4%, usage to net benefits 58.7% and user satisfaction to net benefits 48.8%. The higher the value of these variables, the higher the success rate of the information system using E-learning at the University of Flores. The Delone and Mclean models are very successful in measuring the information system and it is hoped that all Flores University lecturers are required to use e-learning.

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